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Space Administration
Langley Research Center

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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

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  Hanover, MD 21076-1320

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

STAR includes citations to R&D results reported in:

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

The NASA STI Program

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

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

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NASA Center for AeroSpace Information (CASI)

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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 1
03 Air Transportation and Safety 5
04 Aircraft Communications and Navigation 11
05 Aircraft Design, Testing and Performance 12
06 Avionics and Aircraft Instrumentation 19
07 Aircraft Propulsion and Power 22
08 Aircraft Stability and Control 24
09 Research and Support Facilities (Air) 26

Astronautics

12 Astronautics (General) 27
13 Astrodynamics 30
15 Launch Vehicles and Launch Operations 30
17 Space Communications, Spacecraft Communications, Command and Tracking 32
18 Spacecraft Design, Testing and Performance 32
19 Spacecraft Instrumentation and Astrionics 35
20 Spacecraft Propulsion and Power 36

Chemistry and Materials

23 Chemistry and Materials (General) 38
24 Composite Materials 44
25 Inorganic, Organic and Physical Chemistry 47
26 Metals and Metallic Materials 54
27 Nonmetallic Materials 58
28 Propellants and Fuels 62

Engineering

31 Engineering (General) 64
32 Communications and Radar 66
33 Electronics and Electrical Engineering 74
34 Fluid Mechanics and Thermodynamics 101
35 Instrumentation and Photography 107
36 Lasers and Masers 110
37 Mechanical Engineering 112
38 Quality Assurance and Reliability 115
39 Structural Mechanics 116

Geosciences

42 Geosciences (General) 123
43 Earth Resources and Remote Sensing 125
44 Energy Production and Conversion 127
45 Environment Pollution 135
47 Meteorology and Climatology 140
48 Oceanography 147

Life Sciences

51 Life Sciences (General) 148
52 Aerospace Medicine 174
53 Behavioral Sciences 182
54 Man/System Technology and Life Support 183

Mathematical and Computer Sciences

59 Mathematical and Computer Sciences (General) 186
60 Computer Operations and Hardware 199
61 Computer Programming and Software 200
62 Computer Systems 212
63 Cybernetics, Artificial Intelligence and Robotics 218
64 Numerical Analysis 230
65 Statistics and Probability 241
66 Systems Analysis and Operations Research 249
67 Theoretical Mathematics 254

Physics

70 Physics (General) 257
71 Acoustics 281
72 Atomic and Molecular Physics 284
73 Nuclear Physics 285
74 Optics 286
75 Plasma Physics 292
76 Solid-State Physics 293
77 Physics of Elementary Particles and Fields 297

Social and Information Sciences

80 Social and Information Sciences (General) 299
81 Administration and Management 299
82 Documentation and Information Science 301
83 Economics and Cost Analysis 317
84 Law, Political Science and Space Policy 317
85 Technology Utilization and Surface Transportation 317

Space Sciences

88 Space Sciences (General) 318
89 Astronomy 319
90 Astrophysics 322
91 Lunar and Planetary Science and Exploration 326
92 Solar Physics 333
93 Space Radiation 334

General

99 General 335

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

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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.

20070005038 Boeing Co., Chicago, IL, USA

Fast Access, Low Memory, Pair Catalog

Alstad, J. P.; Needelman, D. D.; Li, R.; Fowell, R. A.; Lai, P. C.; 24 Jun 04; 10 pp.; In English
Patent Info.: Filed Filed 24 Jun 04; US-Patent-Appl-SN-10-710 177
Report No.(s): PB2007-102743; No Copyright; Avail.: CASI: A02, Hardcopy

A system (18) includes: (1) A vehicle (12) includes an attitude or angular velocity control system (38), a plurality of star trackers or star sensors (22) each having a field of view (28); (2) a memory (30) having a star catalog (32), a star pair catalog (58) and a reference table (56) stored therein; and (3) a processor (24) coupled to the attitude or angular velocity control system (38), the star trackers or star sensors (22), and the memory (30). The processor (24) determines the vehicle inertial attitude or angular velocity or sensor alignment, based, in part, on the star pair catalog (58) and reference table (56). The design of the star pair catalog (58) and reference table (56) is suitable for rapid determination of attitude or angular velocity or sensor alignment, and an efficient use of memory.
NTIS

Angular Velocity; Attitude Control; Catalogs (Publications); Patent Applications

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.

20070003596 NASA Langley Research Center, Hampton, VA, USA

Three-Dimensional Computational Model for Flow in an Over-Expanded Nozzle With Porous Surfaces

Abdol-Hamid, K. S.; Elmiligui, Alaa; Hunter, Craig A.; Massey, Steven J.; [2006]; 15 pp.; In English; Eighth International Congress of Fluid Dynamics and Propulsion - ICFDP 8, 14-17 Dec. 2006, Cairo, Egypt; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 581-02-08-07; Copyright; Avail.: CASI: A03, Hardcopy

A three-Dimensional computational model is used to simulate flow in a non-axisymmetric, convergent-divergent nozzle incorporating porous cavities for shock-boundary layer interaction control. The nozzle has an expansion ratio (exit area/throat area) of 1.797 and a design nozzle pressure ratio of 8.78. Flow fields for the baseline nozzle (no porosity) and for the nozzle with porous surfaces of 10% openness are computed for Nozzle Pressure Ratio (NPR) varying from 1.29 to 9.54. The three dimensional computational results indicate that baseline (no porosity) nozzle performance is dominated by unstable, shock-induced, boundary-layer separation at over-expanded conditions. For NPR less than or equal to 1.8, the separation is three dimensional, somewhat unsteady, and confined to a bubble (with partial reattachment over the nozzle flap). For NPR greater than or equal to 2.0, separation is steady and fully detached, and becomes more two dimensional as NPR increased. Numerical simulation of porous configurations indicates that a porous patch is capable of controlling off design separation in the nozzle by either alleviating separation or by encouraging stable separation of the exhaust flow. In the present paper, computational simulation results, wall centerline pressure, mach contours, and thrust efficiency ratio are presented, discussed and compared with experimental data. Results indicate that comparisons are in good agreement with experimental data. The three-dimensional simulation improves the comparisons for over-expanded flow conditions as compared with two-dimensional assumptions.

Author

Boundary Layer Separation; Convergent-Divergent Nozzles; Shock Wave Interaction; Three Dimensional Models; Flow Distribution; Dimensional Analysis

20070004895 NASA Glenn Research Center, Cleveland, OH, USA

Optimal Control of Shock Wave Turbulent Boundary Layer Interactions Using Micro-Array Actuation

Anderson, Bernhard H.; Tinapple, Jon; Surber, Lewis; December 2006; 21 pp.; In English; 3rd AIAA FLow Control Conference, 5-8 Jun. 2006, San Francisco, CA, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 984754.02.07.03.03.01

Report No.(s): NASA/TM-2006-214373; AIAA Paper 2006-3197; E-15654; Copyright; Avail.: CASI: A03, Hardcopy

The intent of this study on micro-array flow control is to demonstrate the viability and economy of Response Surface Methodology (RSM) to determine optimal designs of micro-array actuation for controlling the shock wave turbulent boundary layer interactions within supersonic inlets and compare these concepts to conventional bleed performance. The term micro-array refers to micro-actuator arrays which have heights of 25 to 40 percent of the undisturbed supersonic boundary layer thickness. This study covers optimal control of shock wave turbulent boundary layer interactions using standard micro-vane, tapered micro-vane, and standard micro-ramp arrays at a free stream Mach number of 2.0. The effectiveness of the three micro-array devices was tested using a shock pressure rise induced by the 10 shock generator, which was sufficiently strong as to separate the turbulent supersonic boundary layer. The overall design purpose of the micro-arrays was to alter the properties of the supersonic boundary layer by introducing a cascade of counter-rotating micro-vortices in the near wall region. In this manner, the impact of the shock wave boundary layer (SWBL) interaction on the main flow field was minimized without boundary bleed.

Author

Boundary Layers; Supersonic Boundary Layers; Turbulent Boundary Layer; Wave Interaction; Flow Distribution; Actuators

20070004899 NASA Glenn Research Center, Cleveland, OH, USA

Aerodynamic Performance Measurements for a Forward Swept Low Noise Fan

Fite, E. Brian; December 2006; 49 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): NASA3-27752; WBS 22-781-30-41

Report No.(s): NASA/TM-2006-214413; E-15693; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004899; Avail.: CASI: A03, Hardcopy

One source of noise in high tip speed turbofan engines, caused by shocks, is called multiple pure tone noise (MPT's). A new fan, called the Quiet High Speed Fan (QHSF), showed reduced noise over the part speed operating range, which includes MPT's. The QHSF showed improved performance in most respects relative to a baseline fan; however, a partspeed instability discovered during testing reduced the operating range below acceptable limits. The measured QHSF adiabatic efficiency on the fixed nozzle acoustic operating line was 85.1 percent and the baseline fan 82.9 percent, a 2.2 percent improvement. The operating line pressure rise at design point rotational speed and mass flow was 1.764 and 1.755 for the QHSF and baseline fan, respectively. Weight flow at design point speed was 98.28 lbm/sec for the QHSF and 97.97 lbm/sec for the baseline fan. The operability margin for the QHSF approached 0 percent at the 75 percent speed operating condition. The baseline fan maintained sufficient margin throughout the operating range as expected. Based on the stage aerodynamic measurements, this concept shows promise for improved performance over current technology if the operability limitations can be solved.

Author

Aerodynamic Characteristics; Turbofan Engines; Fan Blades; Noise Generators; Aerodynamic Noise; Acoustic Delay Lines

20070004939, Federal Aviation Administration, Tenton, WA, USA

Investigations of Performance of Pneumatic Deicing Boots, Surface Ice Detectors, and Scaling of Intercycle Ice

Hill, E.; Rios, M.; Riley, J. T.; Dumont, C. J.; Uppuluri, S.; Nov. 2006; 160 pp.; In English

Report No.(s): PB2007-103675; No Copyright; Avail.: CASI: A08, Hardcopy

This report represents the results from collaborative icing wind tunnel and flight test investigations of pneumatic deicing boot deicing performance. Also presented are the results of icing wind tunnel investigations into ice accumulations prior to activation of an ice protection system, scaling of intercycle ice accretions, and detection of ice accretion aft of the deicing boots using commercially available surface ice detectors. A 36-inch chord hybrid model of the National Advisory Committee

for Aeronautics 23012 airfoil, with leading-edge ordinates of a 72-inch, full-scale airfoil, was used for the investigations. The tests were part of a collaborative icing research program of the Federal Aviation Administration, the National Aeronautics and Space Administration, Goodrich Aerospace Corporation, the University of Illinois at Urbana-Champaign, Empresa Brasileira de Aeronautica S.A (EMBRAER), and other airplane manufacturers. Ice shapes were documented with photographs, video recordings, tracings, and ice thickness measurements. Selected cases of special interest were documented with molds from which ice castings were made. These castings are available for subsequent aerodynamic testing and other purposes. Icing wind tunnel tests were performed at a true airspeed of 170 knots (195 miles per hour), which is representative of maneuvering and holding airspeeds used by turbopropeller regional air transports. Flight testing of the deicing boots intercycle ice using a fully instrumented EMBRAER EMB-120 aircraft showed lift losses of 25 to 27 percent at the airplane angle of attack for the control column pusher. The lift losses are greater at the aerodynamic stall angles of attack.
NTIS
Deicing; Ice; Ice Formation; Pneumatics

20070005008 NASA Langley Research Center, Hampton, VA, USA
Parametric Evaluation of Thin, Transonic Circulation-Control Airfoils
Schlecht, Robin; Anders, Scott; [2007]; 25 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA
Contract(s)/Grant(s): WBS 561581.02.10.07.05
Report No.(s): AIAA Paper 2007-0272; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005008; Avail.: CASI: A03, Hardcopy

Wind-tunnel tests were conducted in the NASA Langley Transonic Dynamics Tunnel on a 6 percent-thick, elliptical circulation-control airfoil with upper-surface and lower-surface blowing capability. Results for elliptical Coanda trailing-edge geometries, biconvex Coanda trailing-edge geometries, and leading-edge geometries are reported. Results are presented at subsonic and transonic Mach numbers of 0.3 and 0.8, respectively. When considering one fixed trailing-edge geometry, for both the subsonic and transonic conditions it was found that the [3.0:1] ratio elliptical Coanda surface with the most rounded leading-edge [03] performed favorably and was determined to be the best compromise between comparable configurations that took advantage of the Coanda effect. This configuration generated a maximum. (Delta)C(sub 1) = 0.625 at a C(sub mu) = 0.06 at M = 0.3, alpha = 6deg. This same configuration generated a maximum (Delta)C(sub 1) = 0.275 at a C(sub mu) = 0.0085 at M = 0.8, alpha = 3deg.
Author
Circulation Control Airfoils; Transonic Speed; Wind Tunnel Tests; Blowing; Trailing Edges; Coanda Effect; Convexity

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20070005149 NASA Langley Research Center, Hampton, VA, USA
Discrete Roughness Transition for Hypersonic Flight Vehicles
Berry, Scott A.; Horvath, Thomas J.; [2007]; 17 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA
Contract(s)/Grant(s): WBS 732759.07.05
Report No.(s): AIAA Paper 2007-0307; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005149; Avail.: CASI: A03, Hardcopy

The importance of discrete roughness and the correlations developed to predict the onset of boundary layer transition on hypersonic flight vehicles are discussed. The paper is organized by hypersonic vehicle applications characterized in a general sense by the boundary layer: slender with hypersonic conditions at the edge of the boundary layer, moderately blunt with supersonic, and blunt with subsonic. This paper is intended to be a review of recent discrete roughness transition work completed at NASA Langley Research Center in support of agency flight test programs. First, a review is provided of discrete roughness wind tunnel data and the resulting correlations that were developed. Then, results obtained from flight vehicles, in particular the recently flown Hyper-X and Shuttle missions, are discussed and compared to the ground-based correlations.
Author
Boundary Layer Transition; Hypersonic Vehicles; Surface Roughness; Transition Flight; Flight Tests

20070005157 NASA Langley Research Center, Hampton, VA, USA

Fluorescence Visualization of Hypersonic Flow Past Triangular and Rectangular Boundary-layer Trips

Garcia, A. P.; Borg, Stephen E.; Dyakonov, Artem A.; Berry, Scott A.; Inman, Jennifer A.; Alderfer, David W.; [2007]; 14 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 599489.02.07.07.01

Report No.(s): AIAA Paper 2007-0536; Copyright; Avail.: CASI: A03, Hardcopy

Planar laser-induced fluorescence (PLIF) flow visualization has been used to investigate the hypersonic flow of air over surface protrusions that are sized to force laminar-to-turbulent boundary layer transition. These trips were selected to simulate protruding Space Shuttle Orbiter heat shield gap-filler material. Experiments were performed in the NASA Langley Research Center 31-Inch Mach 10 Air Wind Tunnel, which is an electrically-heated, blowdown facility. Two-mm high by 8-mm wide triangular and rectangular trips were attached to a flat plate and were oriented at an angle of 45 degrees with respect to the oncoming flow. Upstream of these trips, nitric oxide (NO) was seeded into the boundary layer. PLIF visualization of this NO allowed observation of both laminar and turbulent boundary layer flow downstream of the trips for varying flow conditions as the flat plate angle of attack was varied. By varying the angle of attack, the Mach number above the boundary layer was varied between 4.2 and 9.8, according to analytical oblique-shock calculations. Computational Fluid Dynamics (CFD) simulations of the flowfield with a laminar boundary layer were also performed to better understand the flow environment. The PLIF images of the tripped boundary layer flow were compared to a case with no trip for which the flow remained laminar over the entire angle-of-attack range studied. Qualitative agreement is found between the present observed transition measurements and a previous experimental roughness-induced transition database determined by other means, which is used by the shuttle return-to-flight program.

Author

Laser Induced Fluorescence; Flow Visualization; Turbulent Boundary Layer; Boundary Layer Transition; Hypersonic Flow

20070005163 NASA Langley Research Center, Hampton, VA, USA

Fluorescence Visualization of Hypersonic Flow over Rapid Prototype Wind-Tunnel Models

Alderfer, D. W.; Danehy, P. M.; Inma, J. A.; Berger, K. T.; Buck, G. M.; Schwartz, R J.; [2007]; 17 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 599489.02.07.07; Copyright; Avail.: CASI: A03, Hardcopy

Reentry models for use in hypersonic wind tunnel tests were fabricated using a stereolithography apparatus. These models were produced in one day or less, which is a significant time savings compared to the manufacture of ceramic or metal models. The models were tested in the NASA Langley Research Center 31-Inch Mach 10 Air Tunnel. Most of the models did not survive repeated tests in the tunnel, and several failure modes of the models were identified. Planar laser-induced fluorescence (PLIF) of nitric oxide (NO) was used to visualize the flowfields in the wakes of these models. Pure NO was either seeded through tubes plumbed into the model or via a tube attached to the strut holding the model, which provided localized addition of NO into the model s wake through a porous metal cylinder attached to the end of the tube. Models included several 2-inch diameter Inflatable Reentry Vehicle Experiment (IRVE) models and 5-inch diameter Crew Exploration Vehicle (CEV) models. Various configurations were studied including different sting placements relative to the models, different model orientations and attachment angles, and different NO seeding methods. The angle of attack of the models was also varied and the location of the laser sheet was scanned to provide three-dimensional flowfield information. Virtual Diagnostics Interface technology, developed at NASA Langley, was used to visualize the data sets in post processing. The use of calibration ‘dotcards’ was investigated to correct for camera perspective and lens distortions in the PLIF images. Lessons learned and recommendations for future experiments are discussed.

Author

Fluorescence; Flow Visualization; Hypersonic Flow; Wind Tunnel Models; Prototypes; Reentry Vehicles; Flow Distribution

20070005418 Technion - Israel Inst. of Tech., Haifa, Israel

Aerodynamic Analysis of Body-Strake Configurations

Sigal, Asher; Jun 2006; 52 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8655-05-1-3005

Report No.(s): AD-A460110; No Copyright; Avail.: CASI: A04, Hardcopy

This report results from a contract tasking Technion - Israel Institute of Science and Technology as follows: The Grantee will investigate methods to improve the rapid aerodynamic prediction of configurations that feature strakes instead of conventional wings. The longitudinal characteristics of body-strake configurations will be estimated using a hybrid approach

that will consider two contributions. (1) The linear (potential) contribution will be estimated; (2) The nonlinear contribution of the whole configuration will be estimated based on cross-flow methods. Analytical results will be generated for five baseline configurations and compared with experimental data.
DTIC
Aerodynamic Characteristics; Aerodynamics; Cross Flow; Design Analysis; Strakes; Vortices

20070005487 Naval Postgraduate School, Monterey, CA USA
Process Improvement at the Aircraft Intermediate Maintenance Detachment (AIMD) at Naval Air Station Whidbey Island
Jafar, Eric; Mejos, Terence N; Yang, Chieh; Dec 2006; 123 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460312; No Copyright; Avail.: CASI: A06, Hardcopy

This project focuses on the J52-P408 engine repair process and the implementation of the ‘AIRSpeed’ program at the Aircraft Intermediate Maintenance Department (AIMD) at Naval Air Station Whidbey Island (NASWI), WA. The project was conducted with the sponsorship and assistance of Program Executive Office Ships (PEO SHIPS) and Program Executive Office Integrated Warfare Systems (PEO IWS). The goal of this project is to analyze how the leadership of AIMD incorporated Theory of Constraints (TOC), Just in Time (JIT), Lean, Six-Sigma, and Lean-Six-Sigma methodologies in the engine repair process, and examine the effects of its application in relation to repair cycle time and overall readiness level. This report will describe and compare the earlier and the current AIRSpeed engine removal and repair processes, starting from the flight line to the ready for issue (RFI) pool at AIMD. Using simulation modeling tools and private industry production and inventory management philosophies, we will make recommendations for further improvement in the repair process. We will examine how the application of AIRSpeed processes contributes to the mission readiness of the USA Navy and Marine Corps fleet of EA-6B Prowler aircraft, while reducing operation and maintenance cost.
DTIC
Aircraft; Detachment; Maintainability; Maintenance

03
AIR TRANSPORTATION AND SAFETY

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

20070003553 NASA Langley Research Center, Hampton, VA, USA
Human Factors Considerations for Performance-Based Navigation
Barhydt, Richard; Adams, Catherine A.; December 2006; 70 pp.; In English
Contract(s)/Grant(s): WBS 931-02-07-07
Report No.(s): NASA/TM-2006-214531; L-19296; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003553; Avail.: CASI: A04, Hardcopy

A transition toward a performance-based navigation system is currently underway in both the USA and around the world. Performance-based navigation incorporates Area Navigation (RNAV) and Required Navigation Performance (RNP) procedures that do not rely on the location of ground-based navigation aids. These procedures offer significant benefits to both operators and air traffic managers. Under sponsorship from the Federal Aviation Administration (FAA), the National Aeronautics and Space Administration (NASA) has undertaken a project to document human factors issues that have emerged during RNAV and RNP operations and propose areas for further consideration. Issues were found to include aspects of air traffic control and airline procedures, aircraft systems, and procedure design. Major findings suggest the need for human factors-specific instrument procedure design guidelines. Ongoing industry and government activities to address air-ground communication terminology, procedure design improvements, and chart-database commonality are strongly encouraged.
Author
Area Navigation; Human Factors Engineering; NASA Programs; Flight Management Systems; Aircraft Performance

20070003595 NASA Ames Research Center, Moffett Field, CA, USA
Operational Interventions to Maintenance Error
Kanki, Barbara G.; Walter, Diane; Dulchinos, VIcki; [1997]; 1 pp.; In English; Ohio State Symposium on Aviation Psychology, 27 Apr. - 1 May 1997, Columbus, OH, USA
Contract(s)/Grant(s): NASA Order H-3889; No Copyright; Avail.: Other Sources; Abstract Only

A significant proportion of aviation accidents and incidents are known to be tied to human error. However, research of flight operational errors has shown that so-called pilot error often involves a variety of human factors issues and not a simple lack of individual technical skills. In aircraft maintenance operations, there is similar concern that maintenance errors which may lead to incidents and accidents are related to a large variety of human factors issues. Although maintenance error data and research are limited, industry initiatives involving human factors training in maintenance have become increasingly accepted as one type of maintenance error intervention. Conscientious efforts have been made in re-inventing the team7 concept for maintenance operations and in tailoring programs to fit the needs of technical opeRAtions. Nevertheless, there remains a dual challenge: 1) to develop human factors interventions which are directly supported by reliable human error data, and 2) to integrate human factors concepts into the procedures and practices of everyday technical tasks. In this paper, we describe several varieties of human factors interventions and focus on two specific alternatives which target problems related to procedures and practices; namely, 1) structured on-the-job training and 2) procedure re-design. We hope to demonstrate that the key to leveraging the impact of these solutions comes from focused interventions; that is, interventions which are derived from a clear understanding of specific maintenance errors, their operational context and human factors components.
Author
Aircraft Accidents; Human Factors Engineering; Pilot Error; Aircraft Maintenance

20070003630 California Univ., Santa Cruz, CA USA
Throughput and Fairness of Collision Avoidance Protocols in Ad Hoc Networks
Jan 2004; 36 pp.; In English
Contract(s)/Grant(s): F49620-00-1-0330; DAAD19-01-C-0026
Report No.(s): AD-A459685; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available
Collision Avoidance; Protocol (Computers); Communication Networks

20070003789 National Transportation Safety Board, Washington, DC USA
National Transportation Safety Board Aircraft Accident Report: Runway Overrun and Collision, Platinum Jet Management, LLC, Bombardier Challenger CL-600-1A11, N370V, Teterboro, New Jersey, on February 2, 2005
Oct. 31, 2006; 126 pp.; In English
Report No.(s): PB2007-910401; NTSB/AAR-06/04; No Copyright; Avail.: CASI: A07, Hardcopy

This report explains the accident involving a Bombardier Challenger CL-600-1A11, N370V, operated by Platinum Jet Management, LLC, which ran off the departure end of runway 6 at Teterboro Airport, Teterboro, New Jersey, during a rejected takeoff. Safety issues addressed in this report include weight and balance procedures; flight crew actions, training, and procedures; company oversight and operational control; Federal Aviation Administration responsibility and oversight; cabin aide actions, training, and procedures; and runway safety areas.
NTIS
Accident Investigation; Collisions; Cost Analysis; Platinum; Runways; Safety; Safety Management; Transportation

20070004659 Armstrong Lab., Brooks AFB, TX USA
Using Observer Ratings to Assess Situational Awareness in Tactical Air Environments
Mar 1997; 12 pp.; In English
Contract(s)/Grant(s): Proj-1123
Report No.(s): AD-A459801; AL/HR-TP-1996-0050; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Situational Awareness; Air Defense; Optical Countermeasures

20070004713 Mitre Corp., Bedford, MA, USA, Massachusetts Inst. of Tech., Lexington, MA, USA
Collision Avoidance for Unmanned Aircraft: Proving the Safety Case
Zeitlin, A.; Lacher, A.; Kuchar, J.; Drumm, A.; Oct. 2006; 18 pp.; In English
Report No.(s): PB2007-101934; MITRE-MP-060219; MIT-LL-42-1017; No Copyright; Avail.: CASI: A03, Hardcopy

Applications for Unmanned Aircraft Systems (UAS) abound from military and homeland security to commercial services. The ability to integrate unmanned and manned aircraft into the same civil airspace is a critical capability that will enable growth in the industry, expansion of applications, and greater utility for UAS operators. Collision avoidance is emerging as a key enabler to UAS civil airspace access as well as an important capability for the integration of manned and unmanned

missions in military theaters of operation. UAS collision avoidance capabilities must be interoperable and compatible with existing collision and separation assurance capabilities including the Traffic Alert and Collisions Avoidance System (TCAS) and the requirement for a pilot to see and avoid other aircraft consistent with the right of way rules. The operational and technical challenges of UAS collision avoidance are further complicated by the wide variety of unmanned aircraft, their associated missions, and their ground control capabilities. While the technology research activities are important to the development of these standards, analysis will be required to ensure that the technical solutions provide a satisfactory level of safety. The intent of this paper is to present one perspective on the system safety studies necessary for the community to reach consensus on the appropriate standards-a necessary step so that a collision avoidance capability of unmanned aircraft can be certified by the FAA.
NTIS
Collision Avoidance; Pilotless Aircraft; Safety

20070004798 Next Generation Air Transportation System, Washington, DC, USA
Next Generation Air Transportation System Integrated Plan
January 2004; 40 pp.; In English
Report No.(s): PB2007-104563; No Copyright; Avail.: National Technical Information Service (NTIS)

The USA has been at the forefront of aviation since the day the Wright Flyer made its historic 12-second flight. Since then, Americans have become the most mobile society on Earth. Imagine, though, what would happen to our economy and quality of life if we could no longer depend on air transportation for overnight delivery or we could no longer depend on arriving when we need to arrive. The U.S. air transportation system as we know it is under stress. The demand for air transportation is outpacing our ability to increase capacity in our airports. Operating and maintenance costs of the air traffic system are outpacing revenues and the air carrier industry is going through significant change. The terrible events of September 11, 2001, radically altered our country and they exposed a new impediment to the future of the air transportation industry. New security requirements are significantly impacting costs and the ability to efficiently move people and cargo.
NTIS
Air Transportation; Planning; Civil Aviation

20070004800 Next Generation Air Transportation System, Washington, DC, USA
Next Generation Air Transportation System 2005 Progress Report
January 2005; 28 pp.; In English
Report No.(s): PB2007-104564; No Copyright; Avail.: National Technical Information Service (NTIS)

In 2003, President Bush and Congress took the first critical step towards transformation with the enactment of VISION 100--Century of Aviation Reauthorization Act (P.L.108-176)--which laid out the mandate for the multi-government agency Next Generation Air Transportation System (NGATS or Next Generation System) and formally created the Joint Planning and Development Office (JPDO) to manage the work associated with it. The overarching vision was for a system that addresses critical safety and economic needs in civil aviation, such as increased capacity, while fully integrating environmental impact, national defense and homeland security improvements--and in a cost effective manner. This vision involves the Departments of Transportation (DOT), Homeland Security (DHS), Defense (DoD), Commerce (DOC), Federal Aviation Administration (FAA) National Aeronautics and Space Administration (NASA), and the White House Office of Science and Technology Policy. The vision would encompass all areas of the aviation community, including all of General Aviation, commercial and public safety helicopter operators as well as traditional commercial and business flight operations.
NTIS
Air Transportation; Civil Aviation; Management Planning

20070004806 Illinois Univ. at Urbana-Champaign, Savoy, IL, USA
Development of Air Traffic Control Measurement Database
Rantanen, E. M.; Oct. 2006; 12 pp.; In English
Contract(s)/Grant(s): DTFAAC-06-P-08010
Report No.(s): PB2007-105629; AHFD-06-08; No Copyright; Avail.: National Technical Information Service (NTIS)

The Air Traffic Control Specialist (ATCS) Performance Measurement Database provides a compilation of techniques that have been proven effective for use in human factor research related to air traffic control. The FAA has established strategic goals of improved ATC system safety and capacity. Performance measures are necessary to determine which elements of the system need to be changed in order to attain these goals, and to determine when progress has been achieved. The primary goal

is to develop a comprehensive set of ATCS performance measures that relate to ATC system safety and capacity. The development of this database is one of several objectives required to achieve this goal.
NTIS
Abilities; Air Traffic Control; Air Traffic Controllers (Personnel); Data Bases; Human Factors Engineering

20070004808 Government Accountability Office, Washington, DC, USA
Next Generation Air Transportation System: Progress and Challenges Associated with the Transformation of the National Airspace System
Nov. 2006; 62 pp.; In English
Report No.(s): PB2007-103723; GAO-07-25; No Copyright; Avail.: CASI: A04, Hardcopy

In 2003, Congress created the Joint Planning and Development Office (JPDO) to plan for and coordinate, with federal and nonfederal stakeholders, a transformation from the current air traffic control system to the 'next generation air transportation system' (NGATS) by 2025. Housed within the Federal Aviation Administration (FAA), JPDO has seven partner agencies: the Departments of Transportation, Commerce, Defense, and Homeland Security; FAA; the National Aeronautics and Space Administration (NASA); and the White House Office of Science and Technology Policy. FAA will have primary responsibility for implementing NGATS. This report addresses (1) the status of JPDO's efforts to plan for NGATS, (2) the key challenges facing JPDO, and (3) the key challenges facing FAA as it implements the transformation. To address these issues, GAO reviewed relevant documents, interviewed agency officials and stakeholders, and conducted an expert panel.
NTIS
Air Traffic Control; Air Transportation; National Airspace System; NASA Programs

20070004864 Texas Univ., Austin, TX, USA
Evaluation and Integration of Texas Airports into the Trans-Texas Corridor, Project Summary
Walton, C. M.; Bomba, M. S.; Aug. 31, 2004; 2 pp.; In English
Report No.(s): PB2007-103695; RTI-PS-0-4644; No Copyright; Avail.: CASI: A01, Hardcopy

The Trans-Texas Corridor (TTC) system has been proposed to provide quick, safe, and reliable movement of people and goods by automobile and rail throughout the state of Texas. The corridor system is expected to relieve congestion on existing roadways, divert hazardous materials away from urban areas, and stimulate economic growth and development. However, in order to ensure that the proposed Trans-Texas Corridor routes will be fully integrated into the states transportation system, the corridors proximity to and potential effects on the existing airport network, as well as any future airport growth, must also be considered in the planning process.
NTIS
Airports; Corridors; Texas

20070005196 Hughes Training, Inc. Mesa, AZ USA
Human Factors Evaluation of the Aerial Gunner Scanner Simulator
Silverman, Denise R; Spiker, Alan; Nullmeyer, Robert T; Jun 1997; 63 pp.; In English
Contract(s)/Grant(s): F41624-95-C-5011; Proj-1123
Report No.(s): AD-A459604; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459604; Avail.: CASI: A04, Hardcopy

This report describes a human factors evaluation of the Aerial Gunner Scanner Simulator(AGSS) that was installed at Kirkland Air Force Base, New Mexico, and is being operated by the 58th Special Operations Wing(SOW). A brief review of the literature concerning the levels of immersion associated with virtual reality(VR) is provided to help establish the nature of the VR environment provided by the AGSS and to give some context for the issues that accompany using VR for training. The evaluation was conducted using structured interviews with questions regarding the fidelity and/or ease of use of components from each of the AGSS's main systems, (i.e., trainee stations, instructor/operator stations, visual, and weapons) and its training capability for selected aerial gunner/scanner (AG/S) skills. Eleven experiences rotary-wing instructors volunteered to participate. The resulting ratings and comments were quite favorable, indicating that most of the AGSS components were acceptable. Two notable exceptions were the spaceball and object detection. Both areas were judges as being significantly poor and received low ratings. We report comments and discuss recommendations associated with the components that were judged acceptable or significantly poor. We conclude with a summary of the main findings and recommendations for improvement with their associated cost estimates.
DTIC
Flight Simulators; Human Factors Engineering; Simulators

20070005214 Aerospace Medical Research Labs., Wright-Patterson AFB, OH USA

Minimizing the Sequenced Delay Time for Escape From High-Speed Low-Level Flight Profiles

Raddin, James H; Specker, Lawrence J; Brinkley, James W; Oct 1979; 12 pp.; In English

Report No.(s): AD-A459680; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459680; Avail.: CASI: A03, Hardcopy

The time delay that occurs between the actuation of an escape system and the actual initiation of the ejection catapult acceleration to separate the crew from an aircraft is one of the critical factors in the design of escape systems for high-speed low-level (HSLL) flight conditions. This delay may preclude what could otherwise be a successful escape from certain HSLL profiles. The purpose of this paper is to examine the significance of current operational delay times and describe techniques to minimize the delays. Operational through-the-canopy ejection data are presented to assess the risk of injury incurred in eliminating the delay time altogether. Experimental data from tests with human volunteers are presented to demonstrate the potential for significantly reducing the time required for upper torso retraction. Finally, the implications of available aeromedical evidence are evaluated in the definition of the most promising approaches to minimize the time required for a HSLL escape sequence.

DTIC

Ejection; Escape Systems; Flight Paths; High Speed

20070005217 Hughes Training, Inc. Mesa, AZ USA

Intelligent Agents for Computer-Generated Forces

George, Gary R; Mallery, Ellen; Pope, Marie; Aug 1996; 29 pp.; In English

Contract(s)/Grant(s): F41624-95-C-5011; Proj-2743

Report No.(s): AD-A459709; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459709; Avail.: CASI: A03, Hardcopy

Computer-generated forces (CGF) are an important part of today’s training devices. When linked to manned simulators, these computer-generated entities provide a dynamic and realistic environment for interaction of human participants. It also allows the addition of many players, which might not be cost effective using many networked, manned devices as an alternative. These CGFs are comprised of two specific objects: equipment model and a behavioral or cognitive model. The equipment model represents the machine which, in this case, is an aircraft with its associated dynamics, weapons systems, controls and avionics systems. The cognitive model corresponds to how the machine operator, a pilot in this case, reacts in the dynamic environment. This will be based on mission knowledge, tactical doctrine, and situation awareness. Modeling of the cognitive portion of the computer-generated forces has been accomplished using several techniques including classical artificial intelligence(AI) techniques such as SOAR (‘talking a State, applying an operator, And generating Results’), other AI formulations such as FuzzyCLIPS and Modular Knowledge, Acquisition Tool (M-KAT), adoption of analytical military models such as Suppressor, and specialized CGFs such as Modular Semi-Automated Force(ModSAF) and Interactive Tactical Environment Management System(ITEMS). This paper overviews these cognitive modeling techniques focusing on 14 specific features associated with intelligent agents.

DTIC

Artificial Intelligence; Flight Simulation; Training Devices

20070005221 Armstrong Lab., Williams AFB, AZ USA

R&D Advances in USAF Pilot Training

Carroll, Lynn A; Andrews, Dee H; Sep 1996; 13 pp.; In English

Contract(s)/Grant(s): Proj-1123

Report No.(s): AD-A459730; AL/HR-TP-1996-0015; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459730; Avail.: CASI: A03, Hardcopy

Recent advances in aircrew training methods and technologies now allow the Air Force to conceptualize training as the peacetime manifestation of war. That is, ground-base pilot training can now move beyond simply training procedural skills to training wartime mission skills on a much more frequent basis than past training range has allowed. We discuss R&D advances in three key areas that will truly allow the US Air Force to train as it intends to fight. These three areas are ‘Warfighter Training Behavioral Research,’ ‘Distributed Mission Training Engineeering Development,’ ‘Night Vision Device Training R&D.’ Under each of these three main categories of R&D, we discuss specific advances made at the Armstrong Laboratory, Human Resource Directorate, Aircrew Training research Division. We also discuss future directions that we believe aircrew R&D should advance in order to provide synthetic training environments that will allow the full measure of warfighting skills to be trained.

DTIC

Flight Simulation; Flight Simulators; Flight Training; Pilot Training; Training Devices

20070005247 Woods Hole Oceanographic Inst., MA USA

An Autonomous Glider Network for the Monterey Bay Predictive Skill Experiment / AOSN-II

Fratantoni, David M; Dec 13, 2006; 8 pp.; In English

Contract(s)/Grant(s): N00014-02-1-0846

Report No.(s): AD-A459840; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459840; Avail.: CASI: A02, Hardcopy

Our long-term goal is to develop a relocatable, sustainable, infrastructure-free ocean observing system composed of low-cost, high-endurance vehicles with near-global range and a modular sensor payload. Particular emphasis is placed on the development of adaptive sampling strategies and the automated control of large glider fleets.

DTIC

Autonomous Navigation; Autonomy; Dynamic Range; Gliders; Models; Monterey Bay (CA); Oceans; Predictions

20070005411 Civil Aeromedical Inst., Oklahoma City, OK USA

A Summary of Unmanned Aircraft Accident/Incident Data: Human Factors Implications

Williams, Kevin W; Dec 2004; 17 pp.; In English

Report No.(s): AD-A460102; DOT/FAA/AM-04/24; No Copyright; Avail.: CASI: A03, Hardcopy

A review and analysis of unmanned aircraft (UA) accident data was conducted to identify important human factors issues related to their use. UA accident data were collected from the U.S. Army, Navy, and Air Force. Classification of the accident data was a two-step process. In the first step, accidents were classified into the categories of human factors, maintenance, aircraft, and unknown. Accidents could be classified into more than one category. In the second step, those accidents classified as human factors-related were classified according to specific human factors issues of alerts/alarms, display design, procedural error, skill-based error, or other. Classification was based on the stated causal factors in the reports, the opinion of safety center personnel, and personal judgment of the author. The percentage of involvement of human factors issues varied across aircraft from 21% to 68%. For most of the aircraft systems, electromechanical failure was more of a causal factor than human error. One critical finding from an analysis of the data is that each of the fielded systems is very different, leading to different kinds of accidents and different human factors issues. A second finding is that many of the accidents that have occurred could have been anticipated through an analysis of the user interfaces employed and procedures implemented for their use. This paper summarizes the various human factors issues related to the accidents.

DTIC

Accidents; Aircraft Accidents; Drone Vehicles; Errors; Failure; Human Factors Engineering; Maintenance; Pilotless Aircraft

20070005414 Civil Aeromedical Inst., Oklahoma City, OK USA

A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series

Collins, William E; Wade, Katherine; Mar 2005; 107 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460106; DOT/FAA/AM-05/3; No Copyright; Avail.: CASI: A06, Hardcopy

A historical, largely photographic retrospective is presented in recognition of the 1000th published report emanating from the FAA aeromedical research center officially established as the Civil Aeromedical Research Institute (CARI) in August 1960. The publications include 57 CARI reports (1961-1963), 1 CARI technical publication (1963), and 942 reports (1964-present) under the aegis of the (now) Office of Aerospace Medicine (OAM). The retrospective includes an historical section on the early development of civil aeromedical research. Additional, theme-related sections provide an indication of some of the varied research contributions and safety achievements of the Institute and cite some of the many individuals who contributed to the Institute's accomplishments.

DTIC

Aerospace Medicine; Civil Aviation

20070005460 Hughes Training, Inc. Mesa, AZ USA

Evaluation of the Modular Semi-Automated Force Air Entity Simulation

Conquest, Michael T; Lerman, David J; Bell, Herbert H; Sep 1996; 25 pp.; In English

Contract(s)/Grant(s): F41624-95-C-5011; Proj-2743

Report No.(s): AD-A460182; AL/HR-TP-1996-0011; No Copyright; Avail.: CASI: A03, Hardcopy

This report describes the Modular Semi-Automated Force (ModSAF) system's capability to provide realistic computer-generated aircraft for use in Advanced Distributed Simulation exercises. This evaluation looked at selected flight performance and mission behavior as well as aerodynamic and flight dynamic exercises. Results indicate that ModSAF provides only a rudimentary capability to realistically depict modern fighter aircraft. Although the ModSAF software architecture is sound and well-organized, incorrect modeling of aircraft and mission behaviors presents serious limitations in using ModSAF to represent current Air Force weapons systems. Recommendations include a complete redesign of the fixed-wing aircraft algorithms and data files as well as an expanded set of mission behaviors.

DTIC

Computer Programs; Computerized Simulation; Evaluation; Fighter Aircraft; Flight Simulation; System Effectiveness

20070005624 Texas Univ., Austin, TX, USA, Texas Dept. of Transportation, Austin, TX, USA, Federal Highway Administration, Austin, TX USA

Trans-Texas Corridor and the Texas Airport System: Opportunities and Challenges

Thompson, K. A.; Bomba, M. S.; Walton, C. M.; Botticello, J. E.; May 2006; 110 pp.; In English

Report No.(s): PB2007-103694; FHWA/TX-06/0-4644-1; No Copyright; Avail.: National Technical Information Service (NTIS)

The proposed Trans-Texas Corridor (TTC) will allow for faster and safer movement of people and goods throughout Texas, relieve congestion on existing roadways, divert hazardous materials away from urban areas, and stimulate economic growth and development along its path. However, to become fully integrated with the Texas transportation network, the TTC must also consider connections with the states extensive airport system. While the TTC could produce significant opportunities for commercial services and general aviation airports, many of its planners and engineers are not familiar with the special land-use and connectivity needs of airports. While the TTC offers prospects for producing significant opportunities to commercial service and general aviation airports, it also has the potential to limit their safety, operation, and expansion if planned poorly. Possible airport benefits include increased usage because of improved airport user access and indirectly because of economic development along its path. Potential challenges include infringement on approaches and approach procedures, restriction of airport growth, limited accessibility or connectivity to the TTC, and competition with land-based modes for passenger and freight movement. Integrating Texas airports into the overall multimodal TTC design will leverage intermodal transportation for intercity travel and freight movement throughout Texas.

NTIS

Airports; Corridors

04
AIRCRAFT COMMUNICATIONS AND NAVIGATION

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

20070005415 Civil Aeromedical Inst., Oklahoma City, OK USA

Complexity and Automation Displays of Air Traffic Control: Literature Review and Analysis

Xing, Jing; Manning, Carol A; Apr 2005; 24 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460107; DOT/FAA/AM-05/4; No Copyright; Avail.: CASI: A03, Hardcopy

This report reviewed a number of measures of complexity associated with visual displays and analyzed the potential to apply these methods to assess the complexity of air traffic control (ATC) displays. Through the literature review, we identified three basic complexity factors: numeric size, variety, and rules. Essentially, all the complexity measures could be described by these factors. Through the analysis of available complexity measures, we showed that neither information complexity that focused on the system nor cognitive complexity that aimed at observers could provide a complete description for ATC application. The great variety in complexity measures reflected the fact that the contribution of each of the three factors to overall complexity depended on how information is processed by users. We generalized that complexity is the integration of

the observer with the three basic factors. Therefore, to develop objective complexity measures for ATC displays, the methods presented in this report need to be integrated with the ATC display specifications.
DTIC
Air Traffic; Air Traffic Control; Display Devices

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.

20070003564 NASA Langley Research Center, Hampton, VA, USA
Method for Correcting Control Surface Angle Measurements in Single Viewpoint Photogrammetry
Burner, Alpheus W., Inventor; Barrows, Danny A., Inventor; October 31, 2006; 8 pp.; In English; Original contains black and white illustrations
Patent Info.: Filed 20 Sep. 2005; US-Patent-7,130725; US-Patent-Appl-SN-239457; NASA-Case-LAR-17021-1; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003564; Avail.: CASI: A02, Hardcopy

A method of determining a corrected control surface angle for use in single viewpoint photogrammetry to correct control surface angle measurements affected by wing bending. First and second visual targets are spaced apart &om one another on a control surface of an aircraft wing. The targets are positioned at a semispan distance along the aircraft wing. A reference target separation distance is determined using single viewpoint photogrammetry for a 'wind off condition. An apparent target separation distance is then computed for 'wind on.' The difference between the reference and apparent target separation distances is minimized by recomputing the single viewpoint photogrammetric solution for incrementally changed values of target semispan distances. A final single viewpoint photogrammetric solution is then generated that uses the corrected semispan distance that produced the minimized difference between the reference and apparent target separation distances. The final single viewpoint photogrammetric solution set is used to determine the corrected control surface angle.
Official Gazette of the U.S. Patent and Trademark Office
Control Surfaces; Correction; Photogrammetry; Angles (Geometry)

20070003726 NASA Langley Research Center, Hampton, VA, USA
Progress in Flaps Down Flight Reynolds Number Testing Techniques at the NTF
Payne, Frank; Bosetti, Cris; Gatlin, Greg; Tuttle, Dave; Griffiths, Bob; [2007]; 10 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007; Original contains color illustrations
Contract(s)/Grant(s): WBS 581-02-08-07-20-03
Report No.(s): AIAA Paper 2007-0751; Copyright; Avail.: CASI: A02, Hardcopy

A series of NASA/Boeing cooperative low speed wind tunnel tests was conducted in the National Transonic Facility (NTF) between 2003 and 2004 using a semi-span high lift model representative of the 777-200 aircraft. The objective of this work was to develop the capability to acquire high quality, low speed (flaps down) wind tunnel data at up to flight Reynolds numbers in a facility originally optimized for high speed full span models. In the course of testing, a number of facility and procedural improvements were identified and implemented. The impact of these improvements on key testing metrics data quality, productivity, and so forth - was significant, and is discussed here, together with the relevance of these metrics as applied to cryogenic wind tunnel testing in general. Details of the improvements at the NTF are discussed in AIAA-2006-0508 (Recent Improvements in Semi-span Testing at the National Transonic Facility). The development work at the NTF culminated with validation testing of a 787-8 semi-span model at full flight Reynolds number in the first quarter of 2006.
Author
Flapping; Flight Tests; Reynolds Number; Transonic Wind Tunnels; Wind Tunnel Tests; Semispan Models; Boeing 777 Aircraft

20070003727 NASA Langley Research Center, Hampton, VA, USA
Review of Cranked-Arrow Wing Aerodynamics Project: Its International Aeronautical Community Role
Lamar, John E.; Obara, Clifford J.; [2007]; 30 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 581-02-08-07
Report No.(s): AIAA Paper 2007-0487; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003727; Avail.: CASI: A03, Hardcopy

This paper provides a brief history of the F-16XL-1 aircraft, its role in the High Speed Research (HSR) program and how it was morphed into the Cranked Arrow Wing Aerodynamics Project (CAWAP). Various flight, wind-tunnel and Computational Fluid Dynamics (CFD) data sets were generated during the CAWAP. These unique and open flight datasets for surface pressures, boundary-layer profiles and skinfriction distributions, along with surface flow data, are described and sample data comparisons given. This is followed by a description of how the project became internationalized to be known as Cranked Arrow Wing Aerodynamics Project International (CAWAPI) and is concluded by an introduction to the results of a 4 year CFD predictive study of data collected at flight conditions by participating researchers.
Author
Wind Tunnel Tests; Aerodynamic Configurations; Aeronautics; Computational Fluid Dynamics; F-16 Aircraft; Civil Aviation; Swept Wings; Aerodynamic Characteristics; Arrow Wings; International Cooperation

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20070003835 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

C-17A Special Operations Low Level II (SOLL II) Supporting the Combatant Commander

Williamson, Jr, Richard E; Jun 2004; 63 pp.; In English
Report No.(s): AD-A459036; AFIT/GMO/ENS/04P-01; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459036; Avail.: CASI: A04, Hardcopy

Shortly after the tragedy of September 11, 2001 and the start of the USA Global War on Terrorism, a dramatic change in the use of airlift forces was realized. The traditional use of strategic and tactical airlift forces was intermingled and the full capabilities of the newest USAF airlifter, the C-17A Globemaster III were put to the test. An elite unit deep within AMC's airlift forces, the SOLL II C-17As at Charleston AFB, provided outstanding results to combatant commanders. This paper did a comparative analysis of three recent military operations relying heavily on airlift to answer the overriding research question: How well, and in what situations, has AMC satisfied the airlift requirement of High Priority, 'External Users' during the USGWOT? Starting with the history of the C-17As role in operations: Allied Force, Enduring Freedom and Iraqi Freedom, this paper described the transformation in airlift and the growing demand for its use in succeeding operations. Each operation was analyzed with respect to how the C-17A forces were employed as tactical assets but remained under strategic control of AMC. The literature review delineated the nuances of operational control of forces during peacetime or contingency operations and showed that AMC was executing authority within the latitude granted by doctrine. The analysis did reveal however that missed opportunities and possible greater success by combatant commanders may have been achieved if control of forces, even time limited tactical control were released to the Joint Force Commander during contingency operations.
DTIC
Transport Aircraft; Combat; Military Operations

20070004581 NASA Langley Research Center, Hampton, VA, USA

USM3D Unstructured Grid Solutions for CAWAPI at NASA LaRC

Lamar, John E.; Abdol-Hamid, Khaled S.; [2007]; 31 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
Report No.(s): AIAA Paper 2007-0682; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004581; Avail.: CASI: A03, Hardcopy

In support the Cranked Arrow Wing Aerodynamic Project International (CAWAPI) to improve the Technology Readiness Level of flow solvers by comparing results with measured F-16XL-1 flight data, NASA Langley employed the TetrUSS unstructured grid solver, USM3D, to obtain solutions for all seven flight conditions of interest. A newly available solver version that incorporates a number of turbulence models, including the two-equation linear and non-linear k-epsilon, was used in this study. As a first test, a choice was made to utilize only a single grid resolution with the solver for the simulation of the different flight conditions. Comparisons are presented with three turbulence models in USM3D, flight data for surface pressure, boundary-layer profiles, and skin-friction results, as well as limited predictions from other solvers. A result of these comparisons is that the USM3D solver can be used in an engineering environment to predict flow physics on a complex configuration at flight Reynolds numbers with a two-equation linear k-epsilon turbulence model.
Author
Arrow Wings; Unstructured Grids (Mathematics); Swept Wings; Aerodynamic Configurations; Computational Fluid Dynamics; Computer Programs

20070004737 Army Research Lab., Aberdeen Proving Ground, MD USA
Failure Analysis of a CH-47 Horizontal Hinge Pin Assembly, P/N 114RS226
Dec 2006; 38 pp.; In English
Report No.(s): AD-A459785; ARL-TR-4011; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Hinges; Failure Analysis; CH-47 Helicopter; Pins

20070004791 Armstrong Lab., Williams AFB, AZ USA
Advanced Distributed Simulation and the Fog-of-Simulation: Lessons Learned from the Cockpit
Mar 1, 1997; 10 pp.; In English
Contract(s)/Grant(s): Proj-1123
Report No.(s): AD-A459545; AL/HR-TP-1996-0038; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Cockpits; Fog; Simulation

20070004936 NASA Langley Research Center, Hampton, VA, USA
High Altitude Long Endurance Air Vehicle Analysis of Alternatives and Technology Requirements Development
Nickol, Craig L.; Guynn, Mark D.; Kohout, Lisa L.; Ozoroski, Thomas A.; [2007]; 17 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 561581.02.08.07; Copyright; Avail.: CASI: A03, Hardcopy

The objective of this study was to develop a variety of High Altitude Long Endurance (HALE) Unmanned Aerial Vehicle (UAV) conceptual designs for two operationally useful missions (hurricane science and communications relay) and compare their performance and cost characteristics. Sixteen potential HALE UAV configurations were initially developed, including heavier-than-air (HTA) and lighter-than-air (LTA) concepts with both consumable fuel and solar regenerative (SR) propulsion systems. Through an Analysis of Alternatives (AoA) down select process, the two leading consumable fuel configurations (one each from the HTA and LTA alternatives) and an HTA SR configuration were selected for further analysis. Cost effectiveness analysis of the consumable fuel configurations revealed that simply maximizing vehicle endurance can lead to a sub-optimum system solution. An LTA concept with a hybrid propulsion system (solar arrays and a hydrogen-air proton exchange membrane fuel cell) was found to have the best mission performance; however, an HTA diesel-fueled wing-body-tail configuration emerged as the preferred consumable fuel concept because of the large size and technical risk of the LTA concept. The baseline missions could not be performed by even the best HTA SR concept. Mission and SR technology trade studies were conducted to enhance understanding of the potential capabilities of such a vehicle. With near-term technology SR-powered HTA vehicles are limited to operation in favorable solar conditions, such as the long days and short nights of summer at higher latitudes. Energy storage system specific energy and solar cell efficiency were found to be the key technology areas for enhancing HTA SR performance.

Author

High Altitude; Pilotless Aircraft; Requirements; Technology Utilization; Aerodynamic Configurations

20070004937 NASA Langley Research Center, Hampton, VA, USA
High-Lift System for a Supercritical Airfoil: Simplified by Active Flow Control
Melton, LaTunia Pack; Schaeffler, Norman W.; Lin, John C.; 2007; 20 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 984754
Report No.(s): AIAA Paper 2007-0707; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004937; Avail.: CASI: A03, Hardcopy

Active flow control wind tunnel experiments were conducted in the NASA Langley Low-Turbulence Pressure Tunnel using a two-dimensional supercritical high-lift airfoil with a 15% chord hinged leading-edge flap and a 25% chord hinged trailing-edge flap. This paper focuses on the application of zero-net-mass-flux periodic excitation near the airfoil trailing edge flap shoulder at a Mach number of 0.1 and chord Reynolds numbers of 1.2 x 10(exp 6) to 9 x 10(exp 6) with leading- and trailing-edge flap deflections of 25 deg. and 30 deg., respectively. The purpose of the investigation was to increase the zero-net-mass-flux options for controlling trailing edge flap separation by using a larger model than used on the low Reynolds number version of this model and to investigate the effect of flow control at higher Reynolds numbers. Static and dynamic surface pressures and wake pressures were acquired to determine the effects of flow control on airfoil performance. Active flow

control was applied both upstream of the trailing edge flap and immediately downstream of the trailing edge flap shoulder and the effects of Reynolds number, excitation frequency and amplitude are presented. The excitations around the trailing edge flap are then combined to control trailing edge flap separation. The combination of two closely spaced actuators around the trailing-edge flap knee was shown to increase the lift produced by an individual actuator. The phase sensitivity between two closely spaced actuators seen at low Reynolds number is confirmed at higher Reynolds numbers. The momentum input required to completely control flow separation on the configuration was larger than that available from the actuators used.
Author
Lift; Wind Tunnel Tests; Supercritical Airfoils; Low Turbulence; Aerodynamic Configurations; Active Control; Actuators; Separated Flow

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20070004941 Dayton Univ. Research Inst., OH, USA
Statistical Loads Data for the Boeing 777-200ER Aircraft in Commercial Operations
Tipps, D. O.; Skinn, D. A.; Rustenburg, J. W.; Jones, T.; Harris, D. A.; Nov. 2006; 104 pp.; In English
Report No.(s): PB2007-103674; UDR-TR-2005-00106; No Copyright; Avail.: CASI: A06, Hardcopy

The University of Dayton Research Institute supports the Federal Aviation Administration (FAA) by conducting research on the structural integrity requirements for the U.S. commercial transport airplane fleet. The primary objective of this task was to support the FAA's Airborne Data Monitoring Systems Research by developing new and improved methods and criteria for processing and presenting large commercial transport airplane flight and ground loads usage data. The scope of activities included: (1) defining the service-related factors that affect the operational life of commercial aircraft; (2) designing an efficient software system to reduce, store, and process large quantities of optical quick access recorder data; and (3) reducing, analyzing, and providing processed data in statistical formats for the FAA to reassess existing certification criteria. Equally important, these new data also will enable the FAA, the aircraft manufacturers, and the airlines to better understand and control those factors that influence the structural integrity of commercial transport aircraft. Presented herein are Boeing 777-200ER aircraft operational usage data collected from 10,047 flights, representing 67,000 flight hours, recorded by a single international operator. Data are presented that will provide the user with statistical information on aircraft usage, ground and flight loads occurrences, and system operational usage based on actual B-777-200ER operational usage. The aircraft usage data include statistics on aircraft weights, flight distances, altitudes, speeds, and flight attitudes.
NTIS
Boeing 777 Aircraft; Loads (Forces)

20070005310 Air War Coll., Maxwell AFB, AL USA
Tanker-Force Structure: Recapitalization of the KC-135
Narvid, Juan C; Aug 2004; 38 pp.; In English
Report No.(s): AD-A459949; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459949; Avail.: CASI: A03, Hardcopy

Aerial refueling is key to the nation's global reach in response to operations in all parts of the world. As such, aerial refueling provides the bridge for air, joint, and coalition forces to deploy anywhere, anytime around the world. It is important in this era of transformation that the tanker force and doctrine of aerial refueling also meet the challenges of the Air Force's task force concept of operations (CONOPS). The KC-135 aircraft has been an outstanding platform for aerial refueling, and through some enhancements, it has been able to leverage some of its capabilities in airlift and communication. However, the Air Force has the opportunity with its next class of tankers to field a tanker with capabilities that can serve all the services in the more demanding joint and coalition warfare of the future. The author challenges air mobility warriors to develop a tanker-force structure that overcomes the thinking of old to launch new concepts and capabilities for the future. He argues that the future of warfare will require a tanker that is able to operate as a force enabler across the full spectrum of operations. The Boeing 767 is being considered as a replacement for the older KC-135s, which the author agrees with. However, he argues, it will not fit the bill when it comes to meeting the challenges of the future -- instead, a tanker designed from the ground up should recapitalize the KC-135 fleet. The tanker of the future cannot resemble the single-role tanker of the past. The author outlines a conceptual tanker that combines airlift and aerial-refueling capabilities, is able to survive in a combat environment, and is able to act as a platform to enhance network-centric warfare. He also examines the chronology of the tanker, and the role it has played throughout military history.
DTIC
C-135 Aircraft; Military Technology; Tanker Aircraft

20070005312 Air Univ., Maxwell AFB, AL USA

Transport Bombers: A Conceptual Shift in Precision-Guided Munitions Delivery

Benson, Bryan J; Jun 1996; 51 pp.; In English

Report No.(s): AD-A459951; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459951; Avail.: CASI: A04, Hardcopy

The U.S. Department of Defense has identified a shortfall in bomber and transport capabilities necessary to execute the two nearly simultaneous major regional contingencies called for in the president's national security strategy. One option to fill the bomber and transport shortfall, though one not discussed in current studies, is to develop transport bombers. This study addresses three questions regarding the transport bomber's usefulness. The first question is whether commanders could use such an aircraft in ways that truly enhance force application and mobility operations without unduly undermining one in favor of the other? The answer, because of technology enhancements and budget constraints, is definitely 'yes.' The second question targets technology by asking whether engineers could place some elements of both missions on a single aircraft? Again, the answer appears to be positive. This study analyzes budgetary and operational constraints in an attempt to answer the third question, which is what is the appropriate force mix? The answer is that either three squadrons of C-17s or two squadrons of B-747-400s would provide the necessary capability. The C-17 is a more versatile and flexible mobility platform than the B-747, and engineers have identified all the technological challenges that will allow it to rapidly convert into a bomber. The B-747, on the other hand, can employ twice as many missiles, carry more than 2 1/2 times the number of cargo pallets, and fly farther than the C-17. However, its ability to 'swing' promptly remains unproven, and it requires intra-theater airlift support to move its cargo to forward operating bases.

DTIC

Bomber Aircraft; Transport Aircraft

20070005336 Naval Research Lab., Washington, DC USA

Project Clinker, Hydraulic Carriage for Airship Installation of Optical Equipment

Daly, P; Rosenberg, T; Sep 22, 1954; 11 pp.; In English

Report No.(s): AD-A459988; NRL-MEMO-REPT-381; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459988; Avail.: CASI: A03, Hardcopy

Airship installation of delicate optical equipment often requires special rigging equipment not available commercially. One problem at this Laboratory called for the installation of an 8.5-foot-diameter mirror weighing nearly 2000 pounds, in a type ZPM-4 airship. The mirror was required to pass beneath a conical windscreen having a 5-foot clearance above the ground and be mounted within the screen at an angle of 45 degrees. One answer to this problem was a carriage having a top deck pivoted at one end. The movable deck was raised to the required angle by a motor driven hydraulic hoist of the type used commercially for dump trucks. The mirror was mounted on this movable deck by means of a wooden cradle which could then be drawn up the incline into position for installation in the airship. The inclined deck contains steel rollers to reduce friction and the cradle moves upward by means of an electric chain hoist. This hydraulic carriage was used successfully in many operations involving installation and removal of the mirror and resulted in a great saving of man-hours of rigging time.

DTIC

Airships; Carriages; Installing; Optical Equipment

20070005349 Air Univ., Maxwell AFB, AL USA

A Need to Know: The Role of Air Force Reconnaissance in War Planning, 1945-1953

Farquhar, John T; Feb 2004; 235 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460023; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460023; Avail.: CASI: A11, Hardcopy

On 1 April 2001, a U.S. Navy EP-3 Aries II surveillance aircraft collided with a People's Liberation Army Air Force J-8 fighter plane that resulted in the loss of the Chinese pilot and an emergency landing on Hainan Island by the Navy plane. The Chinese government's 11-day internment of the Navy flight crew shocked and amazed the American public. The ensuing diplomatic crisis and war of words reminded many of similar incidents from the supposedly defunct Cold War. It also focused world attention upon a still little known but highly significant aspect of the Cold War -- strategic aerial reconnaissance. The term refers to the use of aircraft to collect strategic intelligence using photographic or electronic means. According to the Joint Chiefs of Staff (JCS), strategic intelligence refers to intelligence that is required for the formation of policy and military plans at national and international levels. Strategic intelligence includes information provided by sources other than aircraft, including naval vessels, ground communications intercept sites, satellites, published literature, defectors, and spies. But because Air Force aircraft provided the bulk of information used by American war plans from 1945 to 1953, this book focuses

on the origins of the USAF strategic aerial reconnaissance. Although official JCS publications did not specifically list strategic aerial reconnaissance, the term may be defined as the use of aircraft to gather information necessary to conduct strategic air war, also called strategic air bombardment. At the core of the topic, recently declassified JCS emergency war plans indicate that a strategic air bombardment campaign formed the heart of American military strategy from the end of World War II to the Korean conflict. A question still remains: Did reconnaissance aircraft merely serve as a tool of war planners, or did strategic reconnaissance actually shape military strategy?
DTIC
Aerial Reconnaissance; Intelligence; International Relations; Military Operations; Planning; Politics; Reconnaissance; Warfare

20070005380 Air Mobility Warfare Center, Fort Dix, NJ USA
Aircraft Fuel Cell Repair Equipment (AFCRE)
Yerger, John M; Aug 9, 2006; 11 pp.; In English
Report No.(s): AD-A460061; AMB-05-005; No Copyright; Avail.: CASI: A03, Hardcopy

PROBLEM: Aircraft fuel cell repair time is quite lengthy due to dated troubleshooting tools, sealant cure time and repair validation. PROPOSED SOLUTION: Use helium gas to troubleshoot leaks and validate repairs. Use new technology to remove and cure sealant.
DTIC
Fuel Cells; Maintenance

20070005396 Air Force Research Lab., Wright-Patterson AFB, OH USA
Characterization and Modeling of Bonded Piezoelectric Sensor Performance and Durability in Simulated Aircraft Environments (Preprint)
Blackshire, James L; Martin, Steve; Cooney, Adam; Apr 2006; 9 pp.; In English
Report No.(s): AD-A460083; No Copyright; Avail.: CASI: A02, Hardcopy

The performance characteristics of surface-bonded piezoelectric sensors were studied under accelerated exposure conditions typically found in operational aircraft environments. In particular, sensor performance was studied for freeze-thaw, elevated heat levels, electrochemical attack, substrate bend and tensile strains, and dynamic vibration conditions. Evidence of both gradual and abrupt sensor performance degradation was experimentally observed due to undesired load transfer processes, which resulted in adverse sensor disbond and cracking events. Models were developed to better understand the critical shear-strain and viscoelastic conditions present in a typical surface-bonded sensor system, which permitted key material parameters related to bond and piezoelectric material type to be identified. Preliminary results will be presented for making improved bonded sensor system design choices based on the long-term exposure conditions expected in typical aircraft flight environments. Future activities are focused on verifying system performance using accelerated environmental testing, with the ultimate goal of improving the durability and survivability of surface-bonded piezoelectric sensor systems in typical aerospace environments.
DTIC
Aerospace Environments; Coatings; Durability; Performance Prediction; Piezoelectricity; Shear Stress

20070005410 Civil Aeromedical Inst., Oklahoma City, OK USA
Index to FAA Office of Aerospace Medicine Reports: 1961 through 2004
Collins, William E; Wayda, Michael E; Wade, Katherine; Jan 2005; 85 pp.; In English
Report No.(s): AD-A460101; DOT/FAA/AM-05/1; No Copyright; Avail.: CASI: A05, Hardcopy

An index to Federal Aviation Administration (FAA) Office of Aerospace Medicine reports (OAM) (1964-2004) and Civil Aerospace Medical Institute (CAMI) reports (1961-1963) is presented for those engaged in aviation medicine and related activities. The CAMI is the medical certification, research, education, and occupational health wing of the FAA's OAM. The Institute's mission has not changed over the years: its only purpose is to further aviation safety. At CAMI, researchers study the factors that influence human performance in the aviation environment, find ways to understand them, and communicate that understanding to the aviation community. Communicating research findings to the public is achieved in several ways: published reports in professional journals and newsletters, proceedings reports, and formal technical reports. OAM Reports is the major part of the communications effort. Published continuously since 1961, these reports are the distillation of FAA aeromedical research efforts in aviation safety. Through 2004, CAMI has published 997 reports on a wide range of subjects, from Angular Acceleration to Workload Effects on Complex Performance. The index lists all FAA aerospace medicine

technical reports published from 1961 through 2004 in three ways: chronologically, alphabetically by author, and alphabetically by subject. A foreword describes the index's sections and explains how to obtain copies of published OAM technical reports. A historical vignette describes the earliest efforts to establish new medical leadership at Washington headquarters and CAMI.
DTIC
Aerospace Medicine; Aircraft Safety; Civil Aviation; Flight Safety; United States

20070005419 North Carolina State Univ., Raleigh, NC USA
Design of Autonomous Navigation Controllers for Unmanned Aerial Vehicles Using Multi-Objective Genetic Programming
Barlow, Gregory J; Mar 2004; 182 pp.; In English
Report No.(s): AD-A460111; No Copyright; Avail.: CASI: A09, Hardcopy

Unmanned aerial vehicles (UAVs) have become increasingly popular for many applications, including search and rescue, surveillance, and electronic warfare, but almost all UAVs are controlled remotely by humans. Methods of control must be developed before UAVs can become truly autonomous. While the field of evolutionary robotics (ER) has made strides in using evolutionary computation (EC) to develop controllers for wheeled mobile robots, little attention has been paid to applying EC to UAV control. EC is an attractive method for developing UAV controllers because it allows the human designer to specify the set of high level goals that are to be solved by artificial evolution. In this research, autonomous navigation controllers were developed using multi-objective genetic programming (GP) for fixed wing UAV applications. Four behavioral fitness functions were derived from flight simulations. Multi-objective GP used these fitness functions to evolve controllers that were able to locate an electromagnetic energy source, to navigate the UAV to that source efficiently using on-board sensor measurements, and to circle around the emitter. Controllers were evolved in simulation. To narrow the gap between simulated and real controllers, the simulation environment employed noisy radar signals and a sensor model with realistic inaccuracies.
DTIC
Autonomous Navigation; Control Systems Design; Drone Vehicles; Genetics; Pilotless Aircraft

20070005458 Air War Coll., Maxwell AFB, AL USA
Near Space: Should Air Force Space Command Take Control of Its Shore?
Hall, Kurt D; Sep 2006; 39 pp.; In English
Report No.(s): AD-A460177; No Copyright; Avail.: CASI: A03, Hardcopy

One lesson the DOD realized from recent conflicts, as well as humanitarian and relief operations, involves significant shortfalls in command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR), the enabling mission area that supports joint operations across the range of military operations. These shortfalls include tactical beyond-line-of-sight (BLOS) communications on the move, persistent ISR, red-force tracking, change detection, detection of mines and improvised explosive devices, and all-weather imaging. To correct these shortfalls, Gen John P. Jumper, the former Air Force chief of staff, tasked Air Force Space Command (AFSPC) with the responsibility of developing, fielding, and executing tactical and operationally responsive space (ORS) capabilities near and through space. Although it has expertise in providing capabilities through and in space, AFSPC possesses no such skills in near space-the portion of Earth's atmosphere above internationally controlled airspace (65,000 feet) and below the recognized limit of orbital space (60 miles). Thus, AFSPC created the Joint Warfighting Space (JWS) initiative, which focuses on near space due to the claim of achieving space-like capabilities at a lower cost and providing them directly to tactical commanders. AFSPC claims that future near-space systems will have BLOS communications and ISR persistence measured in days, weeks, and months, greatly exceeding the capabilities of long-endurance vehicles such as unmanned aerial vehicles (UAV). These systems will look like neither satellites nor launch vehicles but more like balloons and blimps. The USA has had experience with the latter two since the 1930s-but at aircraft altitudes. Accordingly, the JWS team galvanized universities and commercial companies to improve current near-space capabilities, and recent experiments with balloons and tactical radios for BLOS communicailons show promise.
DTIC
Command and Control

20070005485 Naval Postgraduate School, Monterey, CA USA
Cost Valuation: A Model for Comparing Dissimilar Aircraft Platforms
Long, Eric J; Dec 2006; 59 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460310; No Copyright; Avail.: CASI: A04, Hardcopy

The purpose of this MBA Project was to investigate and provide an overview of current cost valuation methods used to compare aircraft and then determine if the current methods were satisfactory for comparing dissimilar aircraft platforms. The goal of the project was to develop a model using O&S and procurement cost inputs together with aircraft inventory and utilization data in order to produce a cost per unit hour for any given aircraft. A demonstration of the model's validity using aircraft and cost data from the Predator UAV and the F-16 was then performed to illustrate how it can be used to aid comparisons of dissimilar aircraft platforms that perform similar missions.

DTIC

Aircraft; Cost Analysis; Costs; Mathematical Models; Procurement

20070005490 Naval Postgraduate School, Monterey, CA USA

An Analysis of Earned Value Management Implementation Within the F-22 System Program Office's Software Development

Dibert, John C; Velez, John C; Dec 2006; 143 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460316; No Copyright; Avail.: CASI: A07, Hardcopy

Department of Defense (DoD) use of Earned Value Management (EVM) program control tool has significantly increased in the last ten years. DoD acquisition policy and training promotes EVM as a cost and schedule management tool, tracking the earned value of the work completed per the baseline plan. Acquisition Category ID programs like the US Air Force F-22 fighter program use EVM to manage their software development efforts, but has the program's implementation of EVM followed the industry-recognized 32 criteria outlined in ANSI/EIA-748-A-1998 (Earned Value Management System Standards) necessary to successfully implement EVM? Using these 32 criteria, an evaluation was performed, aimed at assessing the implementation of EVM in the F-22 program. The goal: to academically appraise the program's use of EVM in managing Spiral 2, an F-22 avionics software modernization effort. To accomplish this goal a detailed evaluation of how the program meets the 32 criteria was conducted along with analysis of program data, interviews of subject matter experts and a statistical questionnaire conducted with F-22 personnel. Results indicated areas of possible improvement in the use of EVM and potential changes to the F-22 development environment to improve planning, scheduling and budgeting of the EVM baseline.

DTIC

Acquisition; Computer Programming; F-22 Aircraft; Fighter Aircraft; Software Engineering; Systems Engineering

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.

20070003598 NASA Dryden Flight Research Center, Edwards, CA, USA

Turbulence and Mountain Wave Conditions Observed with an Airborne 2-Micron Lidar

Teets, Edward H., Jr.; Ehernberger, Jack; Bogue, Rodney; Ashburn, Chris; [2007]; 9 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA; Original contains black and white illustrations

Report No.(s): AIAA Paper 2007-79; Copyright; Avail.: CASI: A02, Hardcopy

Joint efforts by the National Aeronautics and Space Administration (NASA), the Department of Defense, and industry partners are enhancing the capability of airborne wind and turbulence detection. The Airborne Coherent Lidar for Advanced In-Flight Measurements (ACLAIM) was flown on three series of flights to assess its capability over a range of altitudes, air mass conditions, and gust phenomena. This paper describes the observation of mountain waves and turbulence induced by mountain waves over the Tehachapi and Sierra Nevada mountain ranges in southern California by lidar onboard the NASA Airborne Science DC-8 airplane. The examples in this paper compare lidar-predicted mountain waves and wave-induced turbulence to subsequent aircraft-measured true airspeed. Airplane acceleration data is presented describing the effects of the wave-induced turbulence on the DC-8 airplane. Highlights of the lidar-predicted airspeed from the two flights show increases of 12 m/s at the mountain wave interface and peak-to-peak airspeed changes of 10 m/s and 15 m/s in a span of 12 s in moderate turbulence.

Author

Turbulence; Airborne Equipment; Radar Measurement; Optical Radar; Detection; Air Masses; Airspeed

20070003685 Turpin Technologies, Foster City, CA, USA

Comanche Helmet-Mounted Display Heading-Tape Simulation

Turpin, Terry; Dowell, Susan; Atencio, Adolph; October 2006; 164 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): NAS2-01055
Report No.(s): NASA/CR-2006-212833; A-0600014; Copyright; Avail.: CASI: A08, Hardcopy

The Aeroflightdynamics Directorate (AMRDEC) conducted a simulation to assess the performance associated with a Contact Analog, world-referenced heading tape as implemented on the Comanche Helmet Integrated Display Sight System (HIDSS) when compared with a Compressed heading tape similar to that specified by the former Military Standard (MIL-STD) 1295. Six experienced pilots flew three modified Aeronautical Design Standards (ADS)-33 maneuvers (Hover Turn, Bob-up, Transient Turn) and a precision traffic pattern in the NASA Vertical Motion Simulator (VMS). Analysis of the pilot objective performance data and subjective handling qualities ratings (HQRs) showed the following: Compressed symbology in the Velocity Stabilization (VelStab) flight mode generally produced the most precise performances over Contact Analog symbology with respect to the heading, altitude, position, and time criteria specified for the maneuvers tested. VelStab outperformed the Automatic Flight Control System (AFCS) on all maneuvers achieving desired performance on most maneuvers for both symbol sets. Performance in the AFCS mode was generally desirable to adequate for heading and altitude and did not meet adequate standards for hover position and time for the Hover Turn and Bob-up maneuvers. VelStab and AFCS performance were nearly the same for the Transient Turn. Pilot comments concerning the Contact Analog heading-tape implementation were generally unfavorable in spite of the achieved levels of performance. HQRs showed Compressed symbology in the VelStab flight mode produced the lowest mean HQR, encompassing mixed ratings of satisfactory handling and needing improvement. All other symbology/flight-mode combinations yielded higher HQRs, which characterized opinions that deficiencies in aircraft handling due to HMD symbology would need improvement. Contact Analog heading tape and other symbology require improvement, especially when operating in the AFCS mode. NASA-TLX rated Compressed symbology in the VelStab flight mode as the least demanding on resources, closely followed by ratings for Contact Analog in the VelStab mode. In a similar pattern, TLX ratings for maneuvers completed in the AFCS mode yielded a higher level of resource demand with even slighter differences between Contact Analog and Compressed symbology sets. Further research should be conducted where objective data and subjective HQR ratings indicate a need for improvement. The areas requiring attention are those where the symbology implementation, the flight control system, or a combination of both caused workload to reach an objectionable level where adequate performance was either difficult to achieve or unachievable. These areas are clearly identified in this report. Symbology that received negative HQR comments by a majority of pilots should also be examined. The summary of pilot comments can be found in appendix A. Additional simulation trials should be considered to address the identified issues.

Author

Helmet Mounted Displays; Flight Simulation; Controllability; Pilot Performance

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20070003686 Turpin Technologies, Foster City, CA, USA

Comanche Helmet-Mounted Display Symbology Simulation

Turpin, Terry S.; Dowell, Susan R.; Szoboszlay, Zoltan; October 2006; 96 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): NAS2-01055
Report No.(s): NASA/CR-2006-212834; A-0600015; Copyright; Avail.: CASI: A05, Hardcopy

The Aeroflightdynamics Directorate (AMRDEC) conducted a simulation to examine the performance of the Comanche Contact Analog world-referenced symbology displayed on the Comanche HIDSS when compared with a compressed symbology design similar to that specified by the former MIL-STD 1295. Six experimental test pilots flew one modified ADS-33 maneuver (hover turn, bob-up), an unusual attitude recovery, and two terrain flight tactical tasks in the NASA Vertical Motion Simulator (VMS). Analysis of the pilot objective performance data and subjective data showed the following results. Objective test results showed that 1295 symbology yielded more rapid maneuvering in the hover turn bob-up than Contact Analog symbology. The average margin of difference in the time to complete the maneuver was approximately two seconds, which was statistically significant. There were no significant differences measured between symbology sets with respect to altitude or position performance measures for all other maneuvers. The NOE target ID task data showed improved accuracy in determining heading to target when using Contact Analog over MIL-STD-1295. Subjective test results, including handling qualities ratings (HQRs) and NASA-TLX workload ratings, showed small but consistent advantages of 1295 symbology over Contact Analog for most parameters. For the bob-up maneuver, 1295 symbology handling qualities were rated Desired for lateral position error and time to complete whereas Contact Analog was rated adequate. The average HQRs for all other maneuvers were rated the same for both symbology sets. Pilot comments and the results of an online questionnaire more strongly favored 1295 over Contact Analog. Repeated comments from all six pilots led to a focus on design issues with six

Contact Analog symbols. Those symbols were the heading tape, horizon line, radar altitude six-second predictor, the position of the torque symbol, the absence of a hover position cue, and the widespread positioning of the symbology to the outer edges of the display field-of-view. Pilots rated the present design of three of the six symbols as having safety-of-flight implications. Those symbols were the heading tape, horizon line, and six-second predictor. To summarize, test results showed no objective data that would warrant restricting experimental test pilots from flying constrained tasks. Small but consistent advantages were recorded for the MILSTD-1295 symbology design when executing ADS-33 constrained tasks. No general performance differences were recorded for the operational maneuvers (NOE, contour flight modes) except for the azimuth-to-target task, which favored the Contact Analog heading tape design. There were consistent and strong pilot comments supporting the MIL-STD-1295 design over Contact Analog in both this current simulation and in Comanche Sim I. Three Contact Analog symbols warrant modification and further evaluation to mitigate safety-of-flight implications noted by participating test pilots. A plan for symbology redesign and testing was developed. However, the Comanche program was cancelled by Department of Army in February 2004.

Author

Helmet Mounted Displays; Controllability; Flight Simulation; Pilot Performance; Flight Control

20070005129 NASA Goddard Space Flight Center, Greenbelt, MD, USA

NASA CEV Reference Entry GN&C System and Analysis

Munday, S.; Madsen, C.; Broome, J.; Gay, R.; Tigges, M.; Strahan, A.; [2007]; 1 pp.; In English; 2007 AAS Guidance and Control Conference, 3-7 Feb. 2007, USA

Contract(s)/Grant(s): CEV 644423.02.36.15.10; No Copyright; Avail.: Other Sources; Abstract Only

As part of its overall objectives, the Orion spacecraft will be required to perform entry and Earth landing functions for Low Earth Orbit (LEO) and Lunar missions. Both of these entry scenarios will begin with separation of the Service Module (SM), making them unique from other Orion mission phases in that only the Command Module (CM) portion of the Crew Exploration Vehicle (CEV) will be involved, requiring a CM specific Guidance, Navigation and Control (GN&C) system. Also common to these mission scenarios will be the need for GN&C to safely return crew (or cargo) to earth within the dynamic thermal and structural constraints of entry and within acceptable accelerations on the crew, utilizing the limited aerodynamic performance of the CM capsule. The lunar return mission could additionally require an initial atmospheric entry designed to support a precision skip and second entry, all to maximize downrange performance and ensure landing in the USA. This paper describes the Entry GN&C reference design, developed by the NASA-led team, that supports these entry scenarios and that was used to validate the Orion System requirements. Description of the reference design will include an overview of the GN&C functions, avionics, and effectors and will relate these to the specific design drivers of the entry scenarios, as well as the desire for commonality in vehicle systems to support the different missions. The discussion will also include the requirement for an Emergency Entry capability beyond that of the nominal performance of the multi-string GNC system, intended to return the crew to the earth in a survivable but unguided manner. Finally, various analyses will be discussed, including those completed to support validation efforts of the current CEV requirements, along with those on-going and planned with the intention to further refine the requirements and to support design development work in conjunction with the prime contractor. Some of these ongoing analyses will include work to size effectors (jets) and fuel budgets, to refine skip entry concepts, to characterize navigation performance and uncertainties, to provide for SM disposal offshore and to identify requirements to support target site selection.

Author

Crew Exploration Vehicle; Spacecraft Control; Systems Analysis; Avionics; Entry Guidance (STS); Autonomous Navigation; NASA Space Programs

20070005131 NASA Johnson Space Center, Houston, TX, USA

NASA CEV Reference GN&C Architecture

Tamblyn, Scott; Hinkel, Heather; Saley, Dave; Feb. 3, 2007; 20 pp.; In English; 30th Annual AAS Guidance and Control Conference, 3-7 Feb. 2007, Breckenridge, CO, USA

Contract(s)/Grant(s): WBS 644423.02.36.15.10

Report No.(s): AAS07-071; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005131; Avail.: CASI: A03, Hardcopy

The Orion Crew Exploration Vehicle (CEV) will be the first human spacecraft built by NASA in almost 3 decades and will be the first vehicle to perform both Low Earth Orbit (LEO) missions and lunar missions since Apollo. The awesome challenge of designing a Guidance, Navigation, and Control (GN&C) system for this vehicle that satisfies all of its various mission requirements is countered by the opportunity to take advantage of the improvements in algorithms, software, sensors,

and other related GN&C technology over this period. This paper describes the CEV GN&C reference architecture developed to support the overall NASA reference configuration and validate the driving requirements of the Constellation (Cx) Architecture Requirements Document (CARD, Reference 1) and the CEV System Requirements Document (SRD, Reference 2). The Orion GN&C team designed the reference architecture based on the functional allocation of GN&C roles and responsibilities of CEV with respect to the other Cx vehicles, such as the Crew Launch Vehicle (CLV), Earth Departure Stage (EDS), and Lunar Surface Area Module (LSAM), across all flight phases. The specific challenges and responsibilities of the CEV GN&C system from launch pad to touchdown will be introduced along with an overview of the navigation sensor suite, its redundancy management, and flight software (FSW) architecture. Sensors will be discussed in terms of range of operation, data utility within the navigation system, and rationale for selection. The software architecture is illustrated via block diagrams, commensurate with the design aspects.
Author

Crew Exploration Vehicle; NASA Space Programs; Space Missions; Spacecraft Guidance; Spacecraft Control; Architecture (Computers); Avionics; Software Engineering

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.

20070004888 NASA Stennis Space Center, Stennis Space Center, MS, USA

Overview of Engineering Design and Analysis at the NASA John C. Stennis Space Center

Ryan, Harry; Congiardo, Jared; Junell, Justin; Kirkpatrick, Richard; [2007]; 1 pp.; In English; Mississippi Engineering Society Meeting, 25-27 Feb. 2007, Jackson, MS, USA; No Copyright; Avail.: Other Sources; Abstract Only

A wide range of rocket propulsion test work occurs at the NASA John C. Stennis Space Center (SSC) including full-scale engine test activities at test facilities A-1, A-2, B-1 and B-2 as well as combustion device research and development activities at the E-Complex (E-1, E-2, E-3 and E-4) test facilities. The propulsion test engineer at NASA SSC faces many challenges associated with designing and operating a test facility due to the extreme operating conditions (e.g., cryogenic temperatures, high pressures) of the various system components and the uniqueness of many of the components and systems. The purpose of this paper is to briefly describe the NASA SSC Engineering Science Directorate s design and analysis processes, experience, and modeling techniques that are used to design and support the operation of unique rocket propulsion test facilities.
Author

Design Analysis; Rocket Test Facilities; Engine Tests; Full Scale Tests

20070004892 United Technologies Research Center, East Hartford, CT, USA

Solid Oxide Fuel Cell APU Feasibility Study for a Long Range Commercial Aircraft Using UTC ITAPS Approach, Volume 1, Aircraft Propulsion and Subsystems Integration Evaluation

Srinivasan, Hari; Yamanis, Jean; Welch, Rick; Tulyani, Sonia; Hardin, Larry; December 2006; 40 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): NAS3-01138; WBS 561581.02.08.03.06.01
Report No.(s): NASA/CR-2006-214458/VOL1; E-15722; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004892; Avail.: CASI: A03, Hardcopy

The objective of this contract effort was to define the functionality and evaluate the propulsion and power system benefits derived from a Solid Oxide Fuel Cell (SOFC) based Auxiliary Power Unit (APU) for a future long range commercial aircraft, and to define the technology gaps to enable such a system. The study employed technologies commensurate with Entry into Service (EIS) in 2015. United Technologies Corporation (UTC) Integrated Total Aircraft Power System (ITAPS) methodologies were used to evaluate system concepts to a conceptual level of fidelity. The technology benefits were captured as reductions of the mission fuel burn and emissions. The baseline aircraft considered was the Boeing 777-200ER airframe with more electric subsystems, Ultra Efficient Engine Technology (UEET) engines, and an advanced APU with ceramics for increased efficiency. In addition to the baseline architecture, four architectures using an SOFC system to replace the conventional APU were investigated. The mission fuel burn savings for Architecture-A, which has minimal system integration, is 0.16 percent. Architecture-B and Architecture-C employ greater system integration and obtain fuel burn benefits of 0.44 and

0.70 percent, respectively. Architecture-D represents the highest level of integration and obtains a benefit of 0.77 percent.
Author
Auxiliary Power Sources; Solid Oxide Fuel Cells; Boeing 777 Aircraft; Ceramics; Airframes

20070004901 NASA Glenn Research Center, Cleveland, OH, USA
A Bearingless Switched-Reluctance Motor for High Specific Power Applications
Choi, Benjamin B.; Siebert, Mark; December 2006; 21 pp.; In English; 42nd Joint Propulsion Conference and Exhibit, 9-12 Jul. 2006, Sacramento, CA, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 561581.02.08.03.06.04
Report No.(s): NASA/TM-2006-214486; AIAA Paper 2006-4804; E-15743; Copyright; Avail.: CASI: A03, Hardcopy

A 12-8 switched-reluctance motor (SRM) is studied in bearingless (or self-levitated) operation with coil currents limited to the linear region to avoid magnetic saturation. The required motoring and levitating currents are summed and go into a single motor coil per pole to obtain the highest power output of the motor by having more space for motor coil winding. Two controllers are investigated for the bearingless SRM operation. First, a model-based controller using the radial force, which is adjusted by a factor derived from finite element analysis, is presented. Then a simple and practical observation-based controller using a PD (proportional-derivative) control algorithm is presented. Both controllers were experimentally demonstrated to 6500 rpm. This paper reports the initial efforts toward eventual self levitation of a SRM operating into strong magnetic core saturation at liquid nitrogen temperature.
Author
Electric Motors; Magnetic Bearings; Bearingless Rotors; Controllers; Proportional Control

20070004966 Waddey and Patterson, Nashville, TN, USA
Recuperator Assembly and Procedures
Kang, Y.; McKeirnan, R. D.; 12 Aug 04; 28 pp.; In English
Contract(s)/Grant(s): DE-FC02-00CH11058
Patent Info.: Filed Filed 12 Aug 04; US-Patent-Appl-SN-10-917 118
Report No.(s): PB2007-100884; No Copyright; Avail.: CASI: A03, Hardcopy

A construction of recuperator core segments is provided which insures proper assembly of the components of the recuperator core segment, and of a plurality of recuperator core segments. Each recuperator core segment must be constructed so as to prevent nesting of fin folds of the adjacent heat exchanger foils of the recuperator core segment. A plurality of recuperator core segments must be assembled together so as to prevent nesting of adjacent fin folds of adjacent recuperator core segments.
NTIS
Gas Turbines; Patent Applications; Regenerators

20070005005 Harper (M. Bruce), Virginia Beach, VA, USA
Method and Device for Creating a Micro Plasma Jet
Mohamed, A. A. H.; Kolb, J. F.; Schoenbach, K. H.; 31 May 05; 12 pp.; In English
Contract(s)/Grant(s): AFOSR-F49620-00-1-0079
Patent Info.: Filed Filed 31 May 05; US-Patent-Appl-SN-11-141-723
Report No.(s): PB2007-103892; No Copyright; Avail.: CASI: A03, Hardcopy

A microhollow cathode discharge assembly capable of generating a low temperature, atmospheric pressure plasma micro jet is disclosed. The microhollow assembly has at two electrodes: an anode and a cathode separated by a dielectric. A microhollow gas passage is disposed through the three layers, preferably in a taper such that the area at the anode is larger than the area at the cathode. When a potential is placed across the electrodes and a gas is directed through the gas passage into the anode and out the cathode, along the tapered direction, then a low temperature micro plasma jet can be created at atmospheric pressure.
NTIS
Ignition; Patent Applications; Plasmas (Physics)

20070005142 NASA Langley Research Center, Hampton, VA, USA
The Art of Extracting One-Dimensional Flow Properties from Multi-Dimensional Data Sets
Baurle, R. A.; Gaffney, R. L.; [2007]; 19 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 599489.02.07.07.01
Report No.(s): AIAA Paper 2007-0639; Copyright; Avail.: CASI: A03, Hardcopy

The engineering design and analysis of air-breathing propulsion systems relies heavily on zero- or one-dimensional properties (e:g: thrust, total pressure recovery, mixing and combustion efficiency, etc.) for figures of merit. The extraction of these parameters from experimental data sets and/or multi-dimensional computational data sets is therefore an important aspect of the design process. A variety of methods exist for extracting performance measures from multi-dimensional data sets. Some of the information contained in the multi-dimensional flow is inevitably lost when any one-dimensionalization technique is applied. Hence, the unique assumptions associated with a given approach may result in one-dimensional properties that are significantly different than those extracted using alternative approaches. The purpose of this effort is to examine some of the more popular methods used for the extraction of performance measures from multi-dimensional data sets, reveal the strengths and weaknesses of each approach, and highlight various numerical issues that result when mapping data from a multi-dimensional space to a space of one dimension.

Author

Flow Characteristics; Air Breathing Engines; Combustion Efficiency; Propulsion System Configurations; Design Analysis; Propulsion System Performance

20070005392 Air Force Research Lab., Wright-Patterson AFB, OH USA
Pulse Detonation Physiochemical and Exhaust Relaxation Processes
Schauer, Frederick R; May 2006; 44 pp.; In English
Contract(s)/Grant(s): Proj-2308
Report No.(s): AD-A460078; AFRL-PR-WP-TR-2006-2125; No Copyright; Avail.: CASI: A03, Hardcopy

The objective of this program is to establish the scientific knowledge of detonation initiation, propagation, and blow-down needed to develop a pulse detonation engine (PDE) that will function on hydrocarbon fuels. The complex interaction of chemistry, gas dynamics, turbulent mixing, and geometry are responsible for the success or failure of the detonation phenomena required to operate a PDE. Detonation tube exhaust blow-down conditions, which are predicted to have a significant impact upon performance, will be explored in order to achieve basic understanding of the relationships between detonation, nozzles, and multiple detonation tube interactions.

DTIC

Detonation; Physiochemistry; Pulse Detonation Engines; Pulsejet Engines

08
AIRCRAFT STABILITY AND CONTROL

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

20070003558 NASA Langley Research Center, Hampton, VA, USA
Angle Measurement System (AMS) for Establishing Model Pitch and Roll Zero, and Performing Single Axis Angle Comparisons
Crawford, Bradley L.; January 2007; 10 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 581-02-09-07
Report No.(s): AIAA Paper 2007-1162; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003558; Avail.: CASI: A02, Hardcopy

The angle measurement system (AMS) developed at NASA Langley Research Center (LaRC) is a system for many uses. It was originally developed to check taper fits in the wind tunnel model support system. The system was further developed to measure simultaneous pitch and roll angles using 3 orthogonally mounted accelerometers (3-axis). This 3-axis arrangement is used as a transfer standard from the calibration standard to the wind tunnel facility. It is generally used to establish model pitch and roll zero and performs the in-situ calibration on model attitude devices. The AMS originally used a laptop computer running DOS based software but has recently been upgraded to operate in a windows environment. Other improvements have

also been made to the software to enhance its accuracy and add features. This paper will discuss the accuracy and calibration methodologies used in this system and some of the features that have contributed to its popularity.
Author
Angles (Geometry); Pitch (Inclination); Roll; Wind Tunnel Models; Accelerometers

20070003597 NASA Dryden Flight Research Center, Edwards, CA, USA
Tailored Excitation for Frequency Response Measurement Applied to the X-43A Flight Vehicle
Baumann, Ethan; January 2007; 29 pp.; In English; Original contains color and black and white illustrations
Report No.(s): NASA/TM-2007-214609; H-2679; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003597;
Avail.: CASI: A03, Hardcopy

An important aspect of any flight research project is assessing aircraft stability and flight control performance. In some programs this assessment is accomplished through the estimation of the in-flight vehicle frequency response. This estimation has traditionally been a lengthy task requiring separate swept sine inputs for each control axis at a constant flight condition. Hypersonic vehicles spend little time at any specific flight condition while they are decelerating. Accordingly, it is difficult to use traditional methods to calculate the vehicle frequency response and stability margins for this class of vehicle. A technique has been previously developed to significantly reduce the duration of the excitation input by tailoring the input to excite only the frequency range of interest. Reductions in test time were achieved by simultaneously applying tailored excitation signals to multiple control loops, allowing a quick estimate of the frequency response of a particular aircraft. This report discusses the flight results obtained from applying a tailored excitation input to the X-43A longitudinal and lateral-directional control loops during the second and third flights. The frequency responses and stability margins obtained from flight data are compared with preflight predictions.
Author
Frequency Ranges; Hypersonic Vehicles; Excitation; Flight Control; Stability; Aircraft Control; Directional Control; Lateral Control

20070003677 NASA Ames Research Center, Moffett Field, CA, USA
Feedback Linearized Aircraft Control Using Dynamic Cell Structure
Jorgensen, C. C.; [1998]; 1 pp.; In English; WAC 98, 10-14 May 1998, Anchorage, AK, USA; No Copyright; Avail.: Other Sources; Abstract Only

A Dynamic Cell Structure (DCS) Neural Network was developed which learns a topology representing network (TRN) of F-15 aircraft aerodynamic stability and control derivatives. The network is combined with a feedback linearized tracking controller to produce a robust control architecture capable of handling multiple accident and off-nominal flight scenarios. This paper describes network and its performance for accident scenarios including differential stabilator lock, soft sensor failure, control, stability derivative variation, and turbulence.
Author
Aircraft Control; Feedback Control; Linearization; Dynamic Control; Neural Nets; Topology

20070005019 NASA Dryden Flight Research Center, Edwards, CA, USA
Guidance and Control of an Autonomous Soaring UAV
Allen, Michael J.; February 2007; 31 pp.; In English; Original contains color illustrations
Report No.(s): NASA/TM-2007-214611; H-2682; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005019;
Avail.: CASI: A03, Hardcopy

Thermals caused by convection in the lower atmosphere are commonly used by birds and glider pilots to extend flight duration, increase cross-country speed, improve range, or simply to conserve energy. Uninhabited Aerial Vehicles (UAVs) can also increase performance and reduce energy consumption by exploiting atmospheric convection. An autonomous soaring research project was conducted at the NASA Dryden Flight Research Center to evaluate the concept through flight test of an electric-powered motor-glider with a wingspan of 4.27 m (14 ft). The UAV’s commercial autopilot software was modified to include outer-loop soaring guidance and control. The aircraft total energy state was used to detect and soar within thermals. Estimated thermal size and position were used to calculate guidance commands for soaring flight. Results from a total of 23 thermal encounters show good performance of the guidance and control algorithms to autonomously detect and exploit thermals. The UAV had an average climb of 172 m (567 ft) during these encounters.
Author
Soaring; Flight Tests; Air Currents; Automatic Pilots; Autonomy; Climbing Flight; Convection Currents; Pilotless Aircraft

20070005228 Boeing Co., Seattle, WA USA

Flight Display Integration

French, Guy A; Hopper, Darrel G; Reising, John M; Snow, Michael P; Oct 18, 2006; 64 pp.; In English

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

Report No.(s): AD-A459774; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459774; 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

Enhanced Vision; Flight Control

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 astronautical facilities see *14 Ground Support Systems and Facilities (Space)*.

20070003589 NASA Langley Research Center, Hampton, VA, USA

Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel

Harvin, S. F.; Cabell, K. F.; Gallimore, S. D.; Mekkes, G. L.; [2006]; 16 pp.; In English; JANNAF 41st Combustion/29th Airbreathing Propulsion/23rd Propulsion Systems Hazards Joint Subcommittee Meeting, 4-8 Dec. 2006, San Diego, Ca, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 759-07-06; Copyright; Avail.: CASI: A03, Hardcopy

The NASA Langley 8-Foot High Temperature Tunnel produces true enthalpy environments simulating flight from Mach 4 to Mach 7, primarily for airbreathing propulsion and aerothermal/thermo-structural testing. Flow conditions are achieved through a methane-air heater and nozzles producing aerodynamic Mach numbers of 4, 5 or 7 and have exit diameters of 8 feet or 4.5 feet. The 12-ft long free-jet test section, housed inside a 26-ft vacuum sphere, accommodates large test articles. Recently, the facility underwent significant upgrades to support hydrocarbon fueled scramjet engine testing and to expand flight simulation capability. The upgrades were required to meet engine system development and flight clearance verification requirements originally defined by the joint NASA-Air Force X-43C Hypersonic Flight Demonstrator Project and now the Air Force X-51A Program. Enhancements to the 8-Ft. HTT were made in four areas: 1) hydrocarbon fuel delivery; 2) flight simulation capability; 3) controls and communication; and 4) data acquisition/processing. The upgrades include the addition of systems to supply ethylene and liquid JP-7 to test articles; a Mach 5 nozzle with dynamic pressure simulation capability up to 3200 psf, the addition of a real-time model angle-of-attack system; a new programmable logic controller sub-system to improve process controls and communication with model controls; the addition of MIL-STD-1553B and high speed data acquisition systems and a classified data processing environment. These additions represent a significant increase to the already unique test capability and flexibility of the facility, and complement the existing array of test support hardware such as a model injection system, radiant heaters, six-component force measurement system, and optical flow field visualization hardware. The new systems support complex test programs that require sophisticated test sequences and precise management of process fluids. Furthermore, the new systems, such as the real-time angle of attack system and the new programmable logic controller enhance the test efficiency of the facility. The motivation for the upgrades and the expanded capabilities is described here.

Author

Aerothermodynamics; Augmentation; Engine Tests; Flight Simulation; Flight Tests; High Temperature; Hypersonic Speed; Supersonic Speed; Vacuum Tests; Wind Tunnels

20070004706 Oak Ridge National Lab., TN USA

Automation & Characterization of US Air Force Bench Top Wind Tuunnels. Summary Report

Hardy, J. E.; McKnight, T. E.; Jones, R. W.; Feb. 2006; 68 pp.; In English

Report No.(s): DE2006-886016; No Copyright; Avail.: National Technical Information Service (NTIS)

The USA Air Force Precision Measurement Equipment Laboratories (PMEL) calibrate over 1,000 anemometer probes per year. To facilitate a more efficient calibration process for probe-style anemometers, the Air Force Metrology and Calibration Program underwent an effort to modernize the existing PMEL bench top wind tunnels. Through a joint effort with the Department of Energy's Oak Ridge National Laboratory, the performance of PMEL wind tunnels was improved. The improvement consisted of new high accuracy sensors, automatic data acquisition, and a software-driven calibration process. As part of the wind tunnel upgrades, an uncertainty analysis was completed, laser Doppler velocimeter profiling was conducted to characterize the velocities at probe locations in the wind tunnel, and pitot tube calibrations of the wind tunnel were verified.

NTIS

Anemometers; Velocity Measurement; Wind Tunnels

20070005272 RAND Corp., Santa Monica, CA USA

The Maintenance Costs of Aging Aircraft: Insights from Commercial Aviation

Dixon, Matthew; Jan 2006; 110 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49642-01-C-0003

Report No.(s): AD-A459880; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459880; Avail.: Defense Technical Information Center (DTIC)

This monograph examines 'aging effects' - i.e., how commercial aircraft maintenance costs change as aircraft grow older. Although commercial aircraft clearly differ from military aircraft, commercial aviation aging-effect estimates might help the Air Force to project how its maintenance costs will change over time.

DTIC

Airline Operations; Commercial Aircraft; Costs; Maintenance

20070005399 Army Engineer Research and Development Center, Vicksburg, MS USA

Seismic Measurement of Concrete Strength Properties

Bell, Haley P; Dec 2006; 84 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): MIPR-3FDPWRPM10

Report No.(s): AD-A460086; ERDC/GSL-TR-06-27; No Copyright; Avail.: CASI: A05, Hardcopy

An assessment of the portable seismic pavement analyzer (PSPA) was conducted during the period February to April 2005 on three military airfields in order to determine the feasibility of rapidly obtaining the modulus and flexural strength of portland cement concrete and asphalt concrete pavements. The PSPA is a nondestructive testing device that measures seismic modulus using ultrasonic surface waves. The objective of this research is to evaluate the PSPA as an alternative to core sampling. This would potentially reduce the amount of time required for testing and eliminate the need for laboratory testing of concrete cores. This report provides (a) background information on the PSPA, (b) a summary of recent PSPA research, (c) test methods used in airfield evaluations, (d) field testing informafion, (e) data analysis, and (f) recommendations for utilizing flexural strength relationships.

DTIC

Airports; Analyzers; Asphalt; Concretes; Flexural Strength; Landing Sites; Pavements; Surface Waves

12

ASTRONAUTICS (GENERAL)

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

20070004681 Oak Ridge National Lab., TN USA, Swales Aerospace, Beltsville, MD, USA

Technology Development Program for an Advanced Potassium Rankine Power Conversion System Compatible with Several Space Reactor Designs

Yoder, G. L.; Carbajo, J. J.; Murphy, R. W.; Moriarty, M. P.; Widman, F. J.; Sep. 2005; 216 pp.; In English

Report No.(s): DE2006-885992; No Copyright; Avail.: National Technical Information Service (NTIS)

This report documents the work performed during the first phase of the National Aeronautics and Space Administration (NASA), National Research Announcement (NRA) Technology Development Program for an Advanced Potassium Rankine Power Conversion System Compatible with Several Space Reactor Designs. The document includes an optimization of both

100-kW(sub e) and 250-kW(sub e) (at the propulsion unit) Rankine cycle power conversion systems. In order to perform the mass optimization of these systems, several parametric evaluations of different design options were investigated. These options included feed and reheat, vapor superheat levels entering the turbine, three different material types, and multiple heat rejection system designs.
NTIS
Nuclear Reactions; Potassium; Rankine Cycle; Reactor Design

20070004980 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, ION Beam Optics, Inc., Thousand Oaks, CA, USA
Concept for Lightweight Spaced-Based Deposition Technology
Fulton, M. L.; Anders, A.; Apr. 2006; 7 pp.; In English
Report No.(s): DE2006-889329; LBNL-59774; No Copyright; Avail.: National Technical Information Service (NTIS)

In this contribution we will describe a technology path to very high quality coatings fabricated in the vacuum of space. To accomplish the ambitious goals set out in NASA's Lunar-Mars proposal, advanced thin-film deposition technology will be required. The ability to deposit thin-film coatings in the vacuum of lunar-space could be extremely valuable for executing this new space mission. Developing lightweight space-based deposition technology (goal:\h300 g, including power supply) will enable the future fabrication and repair of flexible large-area space antennae and fixed telescope mirrors for lunar-station observatories. Filtered Cathodic Arc (FCA) is a proven terrestrial energetic thin-film deposition technology that does not need any processing gas but is well suited for ultra-high vacuum operation. Recently, miniaturized cathodic arcs have already been developed and considered for space propulsion. It is proposed to combine miniaturized pulsed FCA technology and robotics to create a robust, enabling space-based deposition system for the fabrication, improvement, and repair of thin films, especially of silver and aluminum, on telescope mirrors and eventually on large area flexible substrates.
NTIS
Deposition; Spacecraft Design

20070005160 Sandia National Labs., Albuquerque, NM USA
Survey of the Hypervelocity Impact Technology and Applications
Chhabildas, L.; Orphal, D.; May 2006; 26 pp.; In English
Report No.(s): DE2006-887254; SAND2006-3087; No Copyright; Avail.: Department of Energy Information Bridge

HVIS 2005 was a clear success. The Symposium brought together nearly two hundred active researchers and students from thirteen countries around the world. The 84 papers presented at HVIS 2005 constitute an update on current research and the state-of-the-art of hypervelocity science. Combined with the over 7000 pages of technical papers from the eight previous Symposia, beginning in 1986, all published in the International Journal of Impact Engineering, the papers from HVIS 2005 add to the growing body of knowledge and the progressing state-of-the-art of hypervelocity science. It is encouraging to report that even with the limited funding resources compared to two decades ago, creativity and ingenuity in hypervelocity science are alive and well. There is considerable overlap in different disciplines that allows researchers to leverage. Experimentally, higher velocities are now available in the laboratory and are ideally suited for space applications that can be tied to both civilian (NASA) and DoD military applications. Computationally, there is considerable advancement both in computer and modeling technologies. Higher computing speeds and techniques such as parallel processing allow system level type applications to be addressed directly today, much in contrast to the situation only a few years ago. Needless to say, both experimentally and computationally, the ultimate utility will depend on the curiosity and the probing questions that will be incumbent upon the individual researcher. It is quite satisfying that over two dozen students attended the symposium. Hopefully this is indicative of a good pool of future researchers that will be needed both in the government and civilian industries. It is also gratifying to note that novel thrust areas exploring different and new material phenomenology relevant to hypervelocity impact, but a number of other applications as well, are being pursued. In conclusion, considerable progress is still being made that is beneficial for continuous development of hypervelocity impact technology and applications even with the relatively limited resources that are being directed in this field.
NTIS
Hypervelocity Impact; Surveys; Technology Utilization

20070005208 Air Force Doctrine Center, Maxwell AFB, AL USA
Space Operations
Aug 23, 1998; 40 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459658; AFDD-2-2; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459658; Avail.: Defense Technical Information Center (DTIC)

The USA is the world's foremost aerospace power, and our space forces are essential elements of that power. Space systems and capabilities enhance the precision, lethality, survivability, and agility of all operations -- air, land, sea, and special operations. Space operations are key elements in achieving global awareness and maintaining information superiority. Space assets contribute significantly to overall aerospace superiority and support the full spectrum of military actions in theaters of operations. The USA Air Force is an aerospace force comprised of both air and space systems and the people who employ and support these systems. Space Operations doctrine defines space's attributes and its contribution to aerospace power. This document provides employment concepts that integrate space capabilities into theater campaigns. Space Operations describes a command structure for responsive space force operations. As a keystone doctrine document, it underscores the seamless integration of space into the total aerospace effort.
DTIC
Aerospace Environments; Military Operations

20070005385 Air Force Research Lab., Kirkland AFB, NM USA
Issues and Implications of the Thermal Control System on Responsive Space Missions
Williams, Andrew D; Palo, Scott E; Aug 2006; 13 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460070; AFRL-VS-PS-TP-2006-1043; No Copyright; Avail.: CASI: A03, Hardcopy

One aspect that poses a significant hurdle to achieving the goals of Operationally Responsive Space (ORS) is the thermal control system (TCS). Traditionally the TCS must be vigorously designed, analyzed, tested, and optimized from the ground up for every satellite mission. This reinvention of the wheel is costly and time intensive. Current design cycles require years. Next generation satellite thermal management must be robust, modular, and scalable in order to cover a wide range of applications, orbits, and mission requirements. To provide a better understanding of the issues and implications of the TCS and to help bound the problem for the development of robust and modular thermal designs, a preliminary analysis was conducted to determine the upper and lower design bounds for a small responsive satellite. In addition, the range of external heat loads for small satellites in low earth orbit were evaluated. From this analysis, the worst hot and cold cases conditions were identified. Using these two cases, various design parameters were evaluated, three different design approaches were compared, and the feasibility of a one-size-fits-all approach was assessed.
DTIC
Space Missions; Temperature Control

20070005471 Cincinnati Univ., OH USA
Conference Support - Surgery in Extreme Environments - Center for Surgical Innovation
Doarn, Charles R; Jan 2007; 48 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460281; W81XWH-05-1-0414; No Copyright; Avail.: CASI: A03, Hardcopy

This report is a summary of a symposium that was planned and held on December 5-6, 2005, in Houston, TX. The focus of this symposium was on surgery in extreme environments. During this two day event, invited experts from academia, government, and industry gathered to discuss what has already been accomplished in the area of surgery during spaceflight. This included activities underway within DoD, TATRO, NASA, the Russian Space Program, and other activities in which a surgical presence, although limited, was used in extreme environments. This symposium looked at the many challenges that are faced in providing advanced surgical care.
DTIC
Aerospace Medicine; Conferences; Space Flight; Surgery

20070005488 Naval Postgraduate School, Monterey, CA USA
Analyzing the Structure of Air Force Space Acquisitions
Coon, Edith-Dawnn; Gonzalez, Gerardo O; Martin, Jennifer L; Dec 2006; 121 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460313; No Copyright; Avail.: CASI: A06, Hardcopy

The purpose of this research is to analyze the current structure of the acquisition arm of Air Force Space Command using the Policies and Process cornerstone of the Framework for Assessing the Acquisition Function at Federal Agencies. The acquisition arm belonged to Air Force Materiel Command until 1 October 2001, when the reigns were transferred to Air Force Space Command to provide cradle-to-grave management from concept through development, acquisition, sustainment, and final disposal of space systems. The objective of this research is to determine if the current Air Force Space Acquisition policies and processes are efficient and effective according to the GAO-05-218G 'Framework for Assessing the Acquisition

Function at Federal Agencies'. This research will provide results of a questionnaire and will provide an assessment of that questionnaire.
DTIC
Acquisition; Aerospace Systems

13
ASTRODYNAMICS

Includes powered and free flight trajectories; orbital and launching dynamics.

20070005245 Boston Coll., Chestnut Hill, MA USA
Environmental Support to Space Launch
Thorp, Sheryl F; Kapel, Mike; May 31, 2006; 62 pp.; In English
Contract(s)/Grant(s): FA8718-05-C-0085; Proj-1010
Report No.(s): AD-A459835; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459835; Avail.: CASI: A04, Hardcopy

We investigated environmental impacts to space launch at the Eastern and Western Ranges. In order to develop a truly responsive launch capability significant research needs to be conducted in specification and prediction of the atmosphere below 50,000 ft. Present research shows that weather is the leading cause of cancelled space launches (51% at Eastern Range and 58% at Western Range). The ability to forecast weather in support of current requirements was examined. Almost four years (2000 - 2004) of metric data was obtained from the Air Force Space Command (AFSPC). Metrics include weather warnings, weather advisories (watches) and forecasts of Launch Commit Criteria (LCC). The criteria were chosen based on the meteorological conditions found in the LCC. Results demonstrate current shortfalls in forecasting across several key environmental parameters which include lightning, convective and non-convective winds, precipitation and temperature. Both ranges show a large number of false alarms (forecasted but did not verify) for some of the environmental parameters. Even more significant are the low success scores or the probability of issued warnings meeting the desired lead time based on LCC. Ongoing research is focused on improvements in weather prediction which will lead to significant increases in operational responsiveness and decreased cost. Further research is required to improve weather forecasting so that responsive space launch will be realized.
DTIC
Environmental Surveys; Forecasting; Spacecraft Launching

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*.

20070004775 Massachusetts Inst. of Tech., Cambridge, MA USA
Fractionated Spacecraft Architectures Seeding Study
Mathieu, Charlotte; Weigel, Annalisa; Apr 3, 2006; 94 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9453-05-M-0211; Proj-DARP
Report No.(s): AD-A459448; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459448; Avail.: CASI: A05, Hardcopy

The report introduces the concept of spacecraft fractionation, which transforms a traditional monolithic spacecraft into a network of elements where a free-flying payload module is supported by nearby free-flying infrastructure modules supplying communications, data handling, power, etc. Models were developed from a customer-centric perspective to assess different fractionated spacecraft architectures relative to traditional spacecraft architectures using multi-attribute analysis. Along with traditional attributes of mass and cost, nontraditional attributes of maintainability, scalability, flexibility, and responsiveness were included in the assessment. A framework was created to clearly define and evaluate these non-traditional attributes, and appropriate metrics were constructed. This study demonstrates that if those non-traditional attributes are valued enough, customers would choose fractionated spacecraft rather than traditional ones.
DTIC
Fractionation; Transformations (Mathematics); Modules; Aerospace Systems

20070004908 NASA Johnson Space Center, Houston, TX, USA

Crew Exploration Vehicle Ascent Abort Coverage Analysis

Abadie, Marc J.; Berndt, Jon S.; Burke, Laura M.; Falck, Robert D.; Gowan, John W., Jr.; Madsen, Jennifer M.; [2007]; 14 pp.; In English; 2007 AAS Guidance and Control Conference, 3-7 Feb. 2007, Breckenridge, CO, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): CEV 6444423.02.36.15.10; Copyright; Avail.: CASI: A03, Hardcopy

An important element in the design of NASA's Crew Exploration Vehicle (CEV) is the consideration given to crew safety during various ascent phase failure scenarios. To help ensure crew safety during this critical and dynamic flight phase, the CEV requirements specify that an abort capability must be continuously available from lift-off through orbit insertion. To address this requirement, various CEV ascent abort modes are analyzed using 3-DOF (Degree Of Freedom) and 6-DOF simulations. The analysis involves an evaluation of the feasibility and survivability of each abort mode and an assessment of the abort mode coverage using the current baseline vehicle design. Factors such as abort system performance, crew load limits, thermal environments, crew recovery, and vehicle element disposal are investigated to determine if the current vehicle requirements are appropriate and achievable. Sensitivity studies and design trades are also completed so that more informed decisions can be made regarding the vehicle design. An overview of the CEV ascent abort modes is presented along with the driving requirements for abort scenarios. The results of the analysis completed as part of the requirements validation process are then discussed. Finally, the conclusions of the study are presented, and future analysis tasks are recommended.

Author

Ascent; Aborted Missions; Crew Exploration Vehicle; Liftoff (Launching); Upper Stage Rocket Engines

20070005255 L'Garde, Inc., Tustin, CA USA

Developing an Inflatable Solar Array

Malone, Patrick K; Crawford, Larry; Williams, Geoffrey T; Jan 1993; 12 pp.; In English

Report No.(s): AD-A459855; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459855; Avail.: CASI: A03, Hardcopy

L'Garde is developing a light weight deployable solar array wing in the 200-1000 watt range, on the Inflatable Torus Solar Array Technology Demonstration (ITSAT Demo) Project. The power density goal is 90-100 W/Kg for a 200 W wing, including structure and deployment mechanisms. In Phase 1, a proof of concept torus and array was constructed and deployed in the laboratory. A revised Phase 2 Torus and Array are now being fabricated. Phase 3 will be a space flight test. The current design uses crystalline Si cells on an A0 protected flexible Kapton film substrate folded accordion style for stowage. The support structure is a rectangular frame comprised of two inflated cylinders, the array stowage box and its cover. The cylinders, flattened, folded and stored for launch, are deployed inflating with N2 and rigidized by straining the cylinder laminate material controllably beyond the elastic limit. This array is designed for optimum power density but, due to availability, some of the components come from excess production runs. Because of this, the actual power density of the engineering prototype will be about 15% less than the baseline program array, which uses 2.2 mil crystalline silicon cells, 4 in diameter inflatable tubes, and a 4:1 aspect ratio. This project is funded by ARPA with technical management oversight by the Phillips Laboratory.

DTIC

Artificial Satellites; Panels; Silicon; Solar Arrays; Solar Cells

20070005326 Air Univ. Press, Maxwell AFB, AL USA

Into the Unknown Together. The DOD, NASA, and Early Spaceflight

Erickson, Mark; Sep 2005; 683 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459973; B-98; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459973; Avail.: CASI: A99, Hardcopy

Between the 4 October 1957 launching by the Soviet Union of the first artificial earth satellite, Sputnik I, and the successful American landing and return from the moon in July 1969, the USA sponsored five human-spaceflight programs. The author examines the NASA-DOD relationship in human-spaceflight programs by looking at three issues. -- First, what was the attitude of presidents Dwight D. Eisenhower, John F. Kennedy, and Lyndon B. Johnson toward the use of space exploration as a tool to secure international prestige and national pride as part of the Cold War struggle? -- Second, what institutional relationship existed between NASA and the DOD, the level of support, coordination, and rivalry during each president's term(s)? What specific instances and programs illustrate these dynamics? How did NASA achieve greater independence by lessening its reliance on the DOD over those 12 years? -- The third examination will focus on the actual

projects themselves: Mercury, Gemini, Apollo, Dynasoar, and MOL. What was each designed to accomplish and why?
DTIC
Manned Spacecraft; Space Flight

20070005381 Air Force Research Lab., Hanscom AFB, MA USA
Reply to Comment by M. Bodeau on 'Charging of Mirror Surfaces in Space'
Lai, Shu T; Jan 2006; 2 pp.; In English
Contract(s)/Grant(s): Proj-5021
Report No.(s): AD-A460063; No Copyright; Avail.: CASI: A01, Hardcopy

Sputtering can slowly remove material from the surface of a spacecraft mirror, and even at low rates, will shorten the useful life of mirrors. Sputtering will only cause gradual degradation to solar cells, not the sudden stepwise degradation that sudden discharges can cause. These conclusions are not in disagreement with the comment of M. Bodeau. Future Boeing 702 series satellites will he equipped with conventional solar arrays, rather than mirrors. The main point in the Lai article is emphasized: the low photoemission of mirrors may cause differential charging if the space plasma is hot enough, as other parts of the satellite emit photoelectrons and the mirrors emit few photoelectrons.
DTIC
Mirrors; Sputtering

17
SPACE COMMUNICATIONS, SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

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

20070005040 NASA Johnson Space Center, Houston, TX, USA
Numerical Skip-Entry Guidance
Tigges, Michael; Crull, Timothy; Rea, Jeremy; Johnson, Wyatt; February 08, 2006; 21 pp.; In English; 2007 AAS Guidance and Control Conference, 3-7 Feb. 2007, Breckenridge, CO, USA; Original contains color illustrations
Contract(s)/Grant(s): CEV 644423.02.36.15.10; Copyright; Avail.: CASI: A03, Hardcopy

This paper assesses a preliminary guidance and targeting strategy for accomplishing Skip-Entry (SE) flight during a lunar return-capsule entry flight. One of the primary benefits of flying a SE trajectory is to provide the crew with continuous Continental USA (CONUS) landing site access throughout the lunar month. Without a SE capability, the capsule must land either in water or at one of several distributed land sites in the Southern Hemisphere for a significant portion of a lunar month using a landing and recovery scenario similar to that employed during the Apollo program. With a SE trajectory, the capsule can land either in water at a site in proximity to CONUS or at one of several distributed landing sites within CONUS, thereby simplifying the operational requirements for crew retrieval and vehicle recovery, and possibly enabling a high degree of vehicle reusability. Note that a SE capability does not require that the vehicle land on land. A SE capability enables a longer-range flight than a direct-entry flight, which permits the vehicle to land at a much greater distance from the Entry Interface (EI) point. This does not exclude using this approach to push the landing point to a water location in proximity of CONUS and utilizing water or airborne recovery forces.
Author
Trajectories; Guidance (Motion); Position (Location); Landing Sites; Water Landing

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\fSafety*.

20070003580 NASA Marshall Space Flight Center, Huntsville, AL, USA
Electrodynamic Tether
Johnson, Charles L., Inventor; Ballance, Judy L., Inventor; Welzyn, Kenneth J., Inventor; Vaughn, Jason A., Inventor; Lorenzini, Enrico, Inventor; Schuler, Peter S., Inventor; October 10, 2006; 11 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 17 Oct. 2003; US-Patent-7,118, 074; US-Patent-Appl-SN-690161; NASA-Case-MFS-31490-1; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003580; Avail.: CASI: A03, Hardcopy

A tether system for providing thrust to or power subsystems of an artificial satellite in a low earth orbit. The tether has three main sections, an insulated section connected to the satellite, a conducting section connected to the insulating section for drawing in and releasing electrons from the space plasma and a non-conducting section for providing a tension to the other sections of the tether. An oxygen resistant coating is applied to the bare wire of the conducting section as well as the insulated wires of the insulated section that prevents breakdown during tether operations in the space plasma. The insulated and bare wire sections also surround a high tensile flexible polymer core to prevent any debris from breaking the tether during use.

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

Tethering; Electrodynamics; Artificial Satellites; Thrust

20070003591 United Space Alliance, Houston, TX, USA

Lessons Learned From Seven Space Shuttle Missions

Goodman, John; January 2007; 52 pp.; In English; Original contains color and black and white illustrations

Report No.(s): NASA/CR-2007-213697; S-994; Copyright; Avail.: CASI: A04, Hardcopy

Much can be learned from well-written descriptions of the technical and organizational factors that lead to an accident. Subsequent analysis by third parties of investigation reports and associated evidence collected during the investigations can lead to additional insight. Much can also be learned from documented close calls that do not result in loss of life or a spacecraft, such as the Mars Exploration Rover Spirit software anomaly, the SOHO mission interruption, and the NEAR burn anomaly. Seven space shuttle incidents fall into the latter category: Rendezvous Target Failure On STS-41B; Rendezvous Radar Anomaly and Trajectory Dispersion-STS-32 ;Rendezvous Lambert Targeting Anomaly-STS-49; Rendezvous Lambert Targeting Anomaly-STS-51; Zero Doppler Steering Maneuver Anomaly-STS-59; Excessive Propellant Consumption During Rendezvous-STS-69; Global Positioning System Receiver and Associated Shuttle Flight Software Anomalies-STS-91 Procedural work-arounds or software changes prevented them from threatening mission success. Extensive investigations, which included the independent recreation of the anomalies by multiple Shuttle Program organizations, were the key to determining the cause, accurately assessing risk, and identifying software and software process improvements. Lessons learned from these incidents not only validated long-standing operational best practices, but serve to promote discussion and mentoring among Program personnel and are applicable to future space flight programs.

Author

Rendezvous Trajectories; Space Transportation System Flights; Space Shuttle Missions; Mars Exploration; Flight Control; Soho Mission

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20070003680 NASA Johnson Space Center, Houston, TX, USA

Orbiter Gap Filler Bending Model for Re-entry

Campbell, Charles H.; [2007]; 3 pp.; In English; AIAA Aerospace Sciences Meeting, 8-11 Jan. 2007, Reno, NV, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 816-06-02-05-03-05-04; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003680; Avail.: CASI: A01, Hardcopy

Pressure loads on a protruding gap filler during an Orbiter reentry are investigated to evaluate the likelihood of extraction due to pressure loads, and to ascertain how much bending will be induced by re-entry pressure loads. Oblique shock wave theory is utilized to develop a representation of the pressure loads induced on a gap filler for the ISSHVFW trajectory, representative of a heavy weight ISS return. A free body diagram is utilized to react the forces induced by the pressure forces. Preliminary results developed using these methods demonstrate that pressure loads, alone, are not likely causes of gap filler extraction during reentry. Assessment of the amount a gap filler will bend over is presented. Implications of gap filler bending during re-entry include possible mitigation of early boundary layer transition concerns, uncertainty in ground based measurement of protruding gap fillers from historical Orbiter flight history, and uncertainty in the use of Orbiter gap fillers for boundary layer prediction calibration. Authors will be added to the author list as appropriate.

Author

Bending; Fillers; Spacecraft Reentry; International Space Station; Space Shuttles; Models

20070004568 NASA Langley Research Center, Hampton, VA, USA

A Simplified Approach for the Rapid Generation of Transient Heat-Shield Environments

Wurster, Kathryn E.; Zoby, E. Vincent; Mills, Janelle C.; Kamhawi, Hilmi; [2007]; 37 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 423-02-39-04-10-03
Report No.(s): AIAA Paper 2007-0411; Copyright; Avail.: CASI: A03, Hardcopy

A simplified approach has been developed whereby transient entry heating environments are reliably predicted based upon a limited set of benchmark radiative and convective solutions. Heating, pressure and shear-stress levels, non-dimensionalized by an appropriate parameter at each benchmark condition are applied throughout the entry profile. This approach was shown to be valid based on the observation that the fully catalytic, laminar distributions examined were relatively insensitive to altitude as well as velocity throughout the regime of significant heating. In order to establish a best prediction by which to judge the results that can be obtained using a very limited benchmark set, predictions based on a series of benchmark cases along a trajectory are used. Solutions which rely only on the limited benchmark set, ideally in the neighborhood of peak heating, are compared against the resultant transient heating rates and total heat loads from the best prediction. Predictions based on using two or fewer benchmark cases at or near the trajectory peak heating condition, yielded results to within 5-10 percent of the best predictions. Thus, the method provides transient heating environments over the heat-shield face with sufficient resolution and accuracy for thermal protection system design and also offers a significant capability to perform rapid trade studies such as the effect of different trajectories, atmospheres, or trim angle of attack, on convective and radiative heating rates and loads, pressure, and shear-stress levels.

Author

Aerodynamic Heating; Heat Shielding; Transient Heating; Systems Engineering

20070004787 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Control of the ST7 Disturbance Reduction System Flight Experiment

Maghami, P. G.; Hsu, O. C.; ODonnell, J. R., Jr.; [2007]; 10 pp.; In English; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004787; Avail.: CASI: A02, Hardcopy

The Space Technology 7 (ST7) experiment will perform an on-orbit system-level validation of two specific Disturbance Reduction System technologies: colloidal micronewton thrusters and drag-free control. The ST7 Disturbance Reduction System (DRS) is designed to maintain the spacecraft s position with respect to a free-floating test mass while limiting the residual accelerations of that test mass over the frequency range of 1 to 30 mHz. This paper presents the overall design and analysis of the spacecraft drag-free and attitude controllers, with particular attention given to its primary mission mode. These controllers close the loop between the drag-free sensors and the colloidal micronewton thrusters.

Author

Colloids; Space Technology Experiments; Thrustors; Control Systems Design; Systems Engineering

20070005006 NASA Langley Research Center, Hampton, VA, USA

Autonomous Aerobraking Using Thermal Response Surface Analysis

Prince, Jill L.; Dec, John A.; Tolson, Robert H.; [2007]; 10 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 23; Copyright; Avail.: CASI: A02, Hardcopy

Aerobraking is a proven method of significantly increasing the science payload that can be placed into low Mars orbits when compared to an all propulsive capture. However, the aerobraking phase is long and has mission cost and risk implications. The main cost benefit is that aerobraking permits the use of a smaller and cheaper launch vehicle, but additional operational costs are incurred during the long aerobraking phase. Risk is increased due to the repeated thermal loading of spacecraft components and the multiple attitude and propulsive maneuvers required for successful aerobraking. Both the cost and risk burdens can be significantly reduced by automating the aerobraking operations phase. All of the previous Mars orbiter missions that have utilized aerobraking have increasingly relied on onboard calculations during aerobraking. Even though the temperature of spacecraft components has been the limiting factor, operational methods have relied on using a surrogate variable for mission control. This paper describes several methods, based directly on spacecraft component maximum temperature, for autonomously predicting the subsequent aerobraking orbits and prescribing apoapsis propulsive maneuvers to maintain the spacecraft within specified temperature limits. Specifically, this paper describes the use of thermal response surface analysis in predicting the temperature of the spacecraft components and the corresponding uncertainty in this temperature prediction.

Author

Aerobraking; Payloads; Mars Missions; Attitude (Inclination); Temperature Effects; Cost Effectiveness

20070005041 NASA White Sands Test Facility, NM, USA

Pressure Effects on Oxygen Concentration Flammability Thresholds of Materials for Aerospace Applications

Hirsch, David; Williams, Jim; Beeson, Harold; October 2006; 6 pp.; In English; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005041; Avail.: CASI: A02, Hardcopy

Spacecraft materials selection is based on an upward flammability test conducted in a quiescent environment in the highest-expected oxygen-concentration environment. However, NASA s advanced space exploration program is anticipating using various habitable environments. Because limited data is available to support current program requirements, a different test logic is suggested to address these expanded atmospheric environments through the determination of materials self-extinguishment limits. This paper provides additional pressure effects data on oxygen concentration and partial pressure self-extinguishment limits under quiescent conditions. For the range of total pressures tested, the oxygen concentration and oxygen partial pressure flammability thresholds show a near linear function of total pressure. The oxygen concentration/ oxygen partial pressure flammability thresholds depend on the total pressure and appear to increase with increasing oxygen concentration (and oxygen partial pressure). For the Constellation Program, the flammability threshold information will allow NASA to identify materials with increased flammability risk because of oxygen concentration and total pressure changes, minimize potential impacts, and allow for development of sound requirements for new spacecraft and extraterrestrial landers and habitats.

Author

Spacecraft Construction Materials; Flammability; Pressure Effects; Oxygen; Aerospace Engineering

19
SPACECRAFT INSTRUMENTATION AND ASTRIONICS

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

20070005110 NASA Johnson Space Center, Houston, TX, USA

NASA CEV On-Orbit GN&C Analysis

DSouza, Chris; Brazzel, Jack P.; Crane, Tim; [2007]; 1 pp.; In English; 2007 AAS Guidance and Control Conference, 3-7 Feb. 2007, USA

Contract(s)/Grant(s): CEV 644423.02.36.15.10; No Copyright; Avail.: Other Sources; Abstract Only

The Orion spacecraft orbit GN&C system will be required to perform both ISS servicing missions and Lunar sortie and outpost crew transportation. While certain aspects of these two missions are complementary, the two missions are also distinct in many ways. Common between the missions is a Low Earth Orbit (LEO) rendezvous, one with the ISS And the other with the LSAM/EDS stack prior to trans-lunar insertion. The lunar missions will additionally require Orion to perform orbit maintenance in LLO, perform contingency lunar orbit operations including RPOD with the LSAM, perform the TEI maneuver sequence, and execute the trans-Earth cruise. The NASA-led team developed a reference configuration orbit GN&C system capable of executing all of these activities with the same navigation sensor suite and control effectors while fully meeting the requirements being developed for System Requirements Review in advance of prime contractor selection. This paper will present an overview of the analyses performed to support system trade studies, demonstrate the feasibility of the NASA reference configuration, and validate the Orion system requirements. These analyses include linear covariance techniques, 3-DOF Monte Carlo simulations, 6-DOF Monte Carlo simulations, and analytical evaluations of GN&C systems performed by the NASA-led Orion team to characterize the sensitivities of Orion s various missions and assess the unique challenges of each. The first part of this paper will describe the trade studies that were performed in order to characterize the RPOD system performance for both the ISS and the lunar missions including development of an RPOD operations concept, RPOD trajectories, contingency scenarios, docking mechanism and associated contact conditions, post-contact thrust issues, relative navigation sensors, relative navigation sensor target infrastructure. The paper will also discuss concepts for both manually-piloted and automatically executed scenarios, as well as the remotely-piloted contingency scenario in LLO. The second part of the paper will discuss the analyses performed for lunar and cislunar GN&C performance including the accuracy of the post-insertion lunar orbit, the ability of Orion to hit a particular Earth return entry corridor, attitude control solutions for long-duration surface operations, and autonomous navigation in support of TEI without ground tracking.

Author

Spacecraft Guidance; Spacecraft Control; Crew Exploration Vehicle; Spacecraft Orbits; Space Missions; NASA Space Programs; Autonomous Navigation

20
SPACECRAFT PROPULSION AND POWER

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

20070003551 Yale Univ., New Haven, CT USA
Heavy Ion Propulsion in the Megadalton Range
Nov 2006; 13 pp.; In English
Contract(s)/Grant(s): AFSOR-F49620-01-1-0416
Report No.(s): AD-A459691; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Ion Propulsion; Heavy Ions

20070003730 NASA Stennis Space Center, Stennis Space Center, MS, USA
Runtime and Pressurization Analyses of Propellant Tanks
Field, Robert E.; Ryan, Harry M.; Ahuja, Vineet; Hosangadi, Ashvin; Lee, Chung P.; [2007]; 2 pp.; In English; 43rd AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, 8-11 Jul. 2007, Cincinnati, OH, USA; Original contains color illustrations
Contract(s)/Grant(s): NNS06AA12C
Report No.(s): SSTI-2200-0077; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003730; Avail.: CASI: A01, Hardcopy

Multi-element unstructured CFD has been utilized at NASA SSC to carry out analyses of propellant tank systems in different modes of operation. The three regimes of interest at SSC include (a) tank chill down (b) tank pressurization and (c) runtime propellant draw-down and purge. While tank chill down is an important event that is best addressed with long time-scale heat transfer calculations, CFD can play a critical role in the tank pressurization and runtime modes of operation. In these situations, problems with contamination of the propellant by inclusion of the pressurant gas from the ullage causes a deterioration of the quality of the propellant delivered to the test article. CFD can be used to help quantify the mixing and propellant degradation. During tank pressurization under some circumstances, rapid mixing of relatively warm pressurant gas with cryogenic propellant can lead to rapid densification of the gas and loss of pressure in the tank. This phenomenon can cause serious problems during testing because of the resulting decrease in propellant flow rate. With proper physical models implemented, CFD can model the coupling between the propellant and pressurant including heat transfer and phase change effects and accurately capture the complex physics in the evolving flowfields. This holds the promise of allowing the specification of operational conditions and procedures that could minimize the undesirable mixing and heat transfer inherent in propellant tank operation. It should be noted that traditional CFD modeling is inadequate for such simulations because the fluids in the tank are in a range of different sub-critical and supercritical states and elaborate phase change and mixing rules have to be developed to accurately model the interaction between the ullage gas and the propellant. We show a typical run-time simulation of a spherical propellant tank, containing RP-1 in this case, being pressurized with room-temperature nitrogen at 540 R. Nitrogen, shown in blue on the right-hand side of the figures, enters the tank from the diffuser at the top of the figures and impinges on the RP-1, shown in red, while the propellant is being continuously drained at the rate of 1050 lbs/sec through a pipe at the bottom of the tank. The sequence of frames in Figure 1 shows the resultant velocity fields and mixing between nitrogen and RP-1 in a cross-section of the tank at different times. A vortex is seen to form in the incoming nitrogen stream that tends to entrain propellant, mixing it with the pressurant gas. The RP-1 mass fraction contours in Figure 1 are also indicative of the level of mixing and contamination of the propellant. The simulation is used to track the propagation of the pure propellant front as it is drawn toward the exit with the evolution of the mixing processes in the tank. The CFD simulation modeled a total of 10 seconds of run time. As is seen from Figure 1d, after 5.65 seconds the propellant front is nearing the drain pipe, especially near the center of the tank. Behind this pure propellant front is a mixed fluid of compromised quality that would require the test to end when it reaches the exit pipe. Such unsteady simulations provide an estimate of the time that a high-quality propellant supply to the test article can be guaranteed at the modeled mass flow rate. In the final paper, we will discuss simulations of the LOX and propellant tanks at NASA SSC being pressurized by an inert ullage. Detailed comparisons will be made between the CFD simulations and lower order models as well as with test data. Conditions leading to cryo collapse in the tank will also be identified.
Author

Computational Fluid Dynamics; Fuel Tank Pressurization; Propellant Tanks; Propellants; Simulation

20070004891 Minnesota Univ., Minneapolis, MN, USA

Heat Transfer and Fluid Dynamics Measurements in the Expansion Space of a Stirling Cycle Engine

Jiang, Nan; Simon, Terrence W.; December 2006; 19 pp.; In English; International Mechanical Engineering Congress and Exposition, 5-10 Nov. 2006, Chicago, IL, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): NAG3-2482; NCC04GB62G; WBS 138494.04.01.01
Report No.(s): NASA/CR-2006-214454; IMECE 2006-15631; E-15718; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004891; Avail.: CASI: A03, Hardcopy

The heater (or acceptor) of a Stirling engine, where most of the thermal energy is accepted into the engine by heat transfer, is the hottest part of the engine. Almost as hot is the adjacent expansion space of the engine. In the expansion space, the flow is oscillatory, impinging on a two-dimensional concavely-curved surface. Knowing the heat transfer on the inside surface of the engine head is critical to the engine design for efficiency and reliability. However, the flow in this region is not well understood and support is required to develop the CFD codes needed to design modern Stirling engines of high efficiency and power output. The present project is to experimentally investigate the flow and heat transfer in the heater head region. Flow fields and heat transfer coefficients are measured to characterize the oscillatory flow as well as to supply experimental validation for the CFD Stirling engine design codes. Presented also is a discussion of how these results might be used for heater head and acceptor region design calculations.

Author

Stirling Engines; Stirling Cycle; Heat Transfer; Fluid Dynamics; Thermal Energy; Flow Distribution; Computational Fluid Dynamics

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20070004897 NASA Glenn Research Center, Cleveland, OH, USA

Responding to Mechanical Antigravity

Millis, Marc G.; Thomas, Nicholas E.; December 2006; 22 pp.; In English; 42nd Joint Propulsion Conference and Exhibit, 9-12 Jul. 2006, Sacramento, CA, USA; Original contains black and white illustrations
Contract(s)/Grant(s): WBS 599487.02.07.03
Report No.(s): NASA/TM-2006-214390; AIAA Paper 2006-4913; E-15668; Copyright; Avail.: CASI: A03, Hardcopy

Based on the experiences of the NASA Breakthrough Propulsion Physics Project, suggestions are offered for constructively responding to proposals that purport breakthrough propulsion using mechanical devices. Because of the relatively large number of unsolicited submissions received (about 1 per workday) and because many of these involve similar concepts, this report is offered to help the would-be submitters make genuine progress as well as to help reviewers respond to such submissions. Devices that use oscillating masses or gyroscope falsely appear to create net thrust through differential friction or by misinterpreting torques as linear forces. To cover both the possibility of an errant claim and a genuine discovery, reviews should require that submitters meet minimal thresholds of proof before engaging in further correspondence; such as achieving sustained deflection of a level-platform pendulum in the case of mechanical thrusters.

Author

Antigravity; Gyroscopes; Mechanical Devices; Oscillations; Friction; Propulsion

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20070005113 William J. Hughes Technical Center, Atlantic City, NJ, USA, Syport Systems, Inc., Mays Landing, NJ, USA

Spark Ignition Aircraft Engine Endurance Test of Aviation-Grade Ethanol 85

Atwood, D.; Ivanov, A.; Dec. 2006; 63 pp.; In English
Report No.(s): PB2007-103774; No Copyright; Avail.: National Technical Information Service (NTIS)

In 2004, the Federal Aviation Administration (FAA) funded the South Dakota State University in a multiyear effort to research the use of aviation-grade ethanol 85 (AGE-85), a blend of at least 85% ethanol denatured with 2% automotive gasoline, less than 1% biodiesel, and pentane isomerate. The test evaluated engine endurance performance at severe and controlled conditions addressing such issues as wear, performance, materials compatibility, range, efficiency, oil dilution, and deposit formation. The majority of the testing was performed at full-rated power and engine speed under maximum engine and oil temperatures, at best power fuel mixture setting.

NTIS

Engine Tests; Ethyl Alcohol; Fuels; Internal Combustion Engines; Spark Ignition

23
CHEMISTRY AND MATERIALS (GENERAL)

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

20070003605 Geological Survey, Washington, DC USA

Chemical Character of Ground Water in the Shallow Water-Table Aquifer at Selected Localities in the Memphis Area, Tennessee

Jan 1981; 33 pp.; In English

Report No.(s): AD-A459554; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Aquifers; Ground Water; Shallow Water; Water Tables

20070003606 Geological Survey, Washington, DC USA

Chemical Analyses of Water Samples From the Picher Mining Area, Northeast Oklahoma and Southeast Kansas

Jan 1987; 59 pp.; In English

Report No.(s): AD-A459534; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available

Chemical Analysis; Kansas; Mining; Oklahoma; Water

20070003736 Lawrence Livermore National Lab., Livermore, CA USA

Isothermal (Delta)/(Alpha-Prime) Transformation and TTT Diagram in a Plutonium Gallium Alloy

Oudot, B. J. P.; Blobaum, K. J. M.; Wall, M. A.; Schartz, A. J.; Nov. 15, 2005; 12 pp.; In English

Report No.(s): DE2006-888614; UCRL-CONF-217122; No Copyright; Avail.: National Technical Information Service (NTIS)

Differential scanning calorimetry (DSC) is used as an alternative approach to determining the tine-temperature-transformation (TTT) diagram for the martensitic delta to alpha-prime transformation in a Pu-2.0 at% Ga alloy. Previous work suggests that the TTT diagram for a similar alloy exhibits an unusual double-C curve for isothermal holds of less than 100 minutes. Here, we extend this diagram to 18 hours, and confirm the double-C curve behavior. When the sample is cooled prior to the isothermal holds, the delta to alpha-prime transformation is observed as several overlapping exothermic peaks. These peaks are very reproducible, and they are believed to be the result of different kinds of delta to alpha-prime martensitic transformation. This may be due to the presence of different nucleation sites and/or different morphologies.

NTIS

Gallium Alloys; Phase Diagrams; Plutonium; Plutonium Alloys

20070003761 Iowa State Univ. of Science and Technology, Ames, IA USA

Nature of the Distinctive Microscopic Features in R5(SIxGe1-x)4 Magnetic Refrigeration Materials

Ugurlu, O.; January 2006; 108 pp.; In English

Report No.(s): DE2006-888951; No Copyright; Avail.: Department of Energy Information Bridge

Magnetic refrigeration is a promising technology that offers a potential for high energy efficiency. The giant magnetocaloric effect of the R(sub 5)(Si(sub x), Ge(sub 1-x))(sub 4) alloys (where R=rare-earth and O (le) x (le) 1), which was discovered in 1997, make them perfect candidates for magnetic refrigeration applications. In this study the microstructures of Gd(sub 5)(Si(sub x)Ge(sub 1-x))(sub 4) alloys have been characterized using electron microscopy techniques, with the focus being on distinctive linear features first examined in 1999. These linear features have been observed in R(sub 5)(Si(sub x), Ge(sub 1-x))(sub 4) alloys prepared from different rare-earths (Gd, Tb, Dy and Er) with different crystal structures (Gd(sub 5)Si(sub 4)-type orthorhombic, monoclinic and Gd(sub 5)Ge(sub 4)-type orthorhombic). Systematic scanning electron microscope studies revealed that these linear features are actually thin-plates, which grow along specific directions in the matrix material. The crystal structure of the thin-plates has been determined as hexagonal with lattice parameters a=b=8.53 (angstrom) and c=6.40 (angstrom) using selected area diffraction (SAD). Energy dispersive spectroscopy analysis, carried out in both scanning and transmission electron microscopes, showed that the features have a composition approximating to R(sub 5)(Si(sub x),Ge(sub 1-x)(sub 3)) phase. Orientation relationship between the matrix and the thin-plates has been calculated as (-1010)(1-211)(sub p)//(010)(10-2)(sub m). The growth direction of the thin plates are calculated as (22 0 19) and (-22 0 19) by applying the Ag approach of Zhang and Purdy to the SAD patterns of this system. High Resolution TEM images of the

Gd(sub 5)Ge(sub 4) were used to study the crystallographic relationship. A terrace-ledge structure was observed at the interface and a 7(sup o) rotation of the reciprocal lattices with respect to each other, consistent with the determined orientation relationship, was noted. Both observations are consistent with the stated hypothesis that the growth direction of the thin-plates is parallel to an invariant line direction.
NTIS
Electron Microscopy; Magnetic Cooling; Magnetic Materials; Refrigerating

20070003773 Lawrence Livermore National Lab., Livermore, CA USA
CALE EOS Form 2 Fits for High Pressure Fused Silica Hugoniot Data
Hare, D. E.; Managan, R. A.; Jan. 05, 2006; 20 pp.; In English
Report No.(s): DE2006-888612; UCRL-TR-217957; No Copyright; Avail.: Department of Energy Information Bridge

The Hugoniot data on fused silica that are displayed on page 321 of the well-known volume ‘LASL Shock Hugoniot Data, Stanley P. Marsh, Editor’ are fit to the EOS form 2 such as is used in CALE and other hydrocodes. Two fits are given: one to represent that data set over its full range (up to 84 GPa (840 kbar)) as well as a better fit for the pressure range below about 33 GPa (330 kbar). These EOSs have the strong point of being relatively simple for the user to implement and should be used to roughly represent the beyond-elastic response of fused silica in hydrocode simulations. They will not correctly reproduce the complex multiple-wave ramp-shock structure known to exist in fused silica at lower pressures.
NTIS
High Pressure; Silica Glass; Silicon Dioxide

20070004667 Air Force Research Lab., Tyndall AFB, FL USA
Electrothermal Desorption of CWA Simulants from Activated Carbon Cloth
Sep 2006; 15 pp.; In English
Contract(s)/Grant(s): F08637-03-C-6006; Proj-ARMT
Report No.(s): AD-A459754; AFRL-ML-TY-TP-2006-4565; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Activated Carbon; Carbon Fibers; Joule-Thomson Effect

20070004692 Army Research Lab., Aberdeen Proving Ground, MD USA
Effect of the FlashJet Paint Removal System on Rotor Blade Skin Materials
Dec 2006; 36 pp.; In English
Report No.(s): AD-A459742; ARL-TR-4003; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Paint Removal; Rotor Blades (Turbomachinery)

20070004718 Bechtel BWXT Idaho, LLC, Idaho Falls, ID, USA
Structures Including Network and Topology for Identifying, Locating and Quantifying Physical Phenomena
Richardson, J. G.; Moore, K. A.; Carrington, R. A.; 17 Nov 04; 14 pp.; In English
Contract(s)/Grant(s): DE-AC07-99ID13727
Patent Info.: Filed Filed 17 Nov 04; US-Patent-Appl-SN-10-992 440
Report No.(s): PB2007-100879; No Copyright; Avail.: CASI: A03, Hardcopy

A method and system for detecting, locating and quantifying a physical phenomena such as strain or a deformation in a structure. A plurality of laterally adjacent conductors may each include a plurality of segments. Each segment is constructed to exhibit a unit value representative of a defined energy transmission characteristic. A plurality of identity groups are defined with each identity group comprising a plurality of segments including at least one segment from each of the plurality of conductors. The segments contained within an identity group are configured and arranged such that each of their associated unit values may be represented by a concatenated digit string which is a unique number relative to the other identity groups. Additionally, the unit values of the segments within an identity group maintain unique ratios with respect to the other unit values in the identity group.
NTIS
Deformation; Identifying; Patent Applications; Physical Factors; Position (Location); Topology

20070004736 Argonne National Lab., IL, USA

Fuel-Cladding Interaction Layers in Irradiated U-Zr and U-Pu Zr Fuel Elements

Keiser, D. D.; January 2006; 50 pp.; In English

Report No.(s): DE2006-885496; ANL-NT-240; No Copyright; Avail.: Department of Energy Information Bridge

Argonne National Laboratory is developing an electrometallurgical treatment for spent nuclear fuels. The initial demonstration of this process is being conducted on U-Zr and U-Pu-Zr alloy fuel elements irradiated in the Experimental Breeder Reactor-II (EBR-II). The electrometallurgical treatment process extracts usable uranium from irradiated fuel elements and places residual fission products, actinides, process Zr, and cladding hulls (small segments of tubing) into two waste forms--a ceramic and a metal alloy. The metal waste form will contain the cladding hulls, Zr, and noble metal fission products, and it will be disposed of in a geologic repository. As a result, the expected composition of the waste form will need to be well understood. This report deals with the condition of the cladding, which will make up a large fraction of the metal waste form, after irradiation in EBR-II and before insertion into the electrorefiner. Specifically, it looks at layers that can be found on the inner surface of the cladding due to in-reactor interactions between the alloy fuel and the stainless steel cladding that occurs after the fuel has swelled and contacted the cladding. Many detailed examinations of fuel elements irradiated in EBR-II have been completed and are discussed in the context of interaction layer formation in irradiated cladding. The composition and thickness of the developed interaction layers are identified, along with the irradiation conditions, cladding type, and axial location on fuel elements where the thickest interaction layers can be expected to develop. It has been found that the largest interaction zones are observed at combined high power and high temperature regions of fuel elements and for fuel elements with U-Pu-Zr alloy fuel and D9 stainless steel cladding. The most prevalent, non-cladding constituent observed in the developed interaction layers are the lanthanide fission products.

NTIS

Cladding; Irradiation; Spent Fuels; Uranium; Plutonium; Zirconium

20070004763 Army Research Lab., Aberdeen Proving Ground, MD USA

Compression and Instrumented Indentation Measurements on Biomimetic Polymers

Sep 2006; 14 pp.; In English

Contract(s)/Grant(s): Proj-622105.AH76

Report No.(s): AD-A459773; ARL-RP-135; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Biomimetics; Indentation; Polymers; Measurement; Compression Tests

20070004783 Brown Univ., Providence, RI USA

Virtual Design and Testing of Materials: A Multiscale Approach

Curtin, W A; Needleman, A; Ortiz, M; Phillips, R; Kaxiras, E; Cedar, G; Carter, E; Miller, R; Woodward, C; Farkas, D; Jun 30, 2006; 14 pp.; In English

Contract(s)/Grant(s): F49620-99-1-0272

Report No.(s): AD-A459263; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459263; Avail.: CASI: A03, Hardcopy

The aim of the work proposed here is the development of a virtual testing and design capability that can be used to test -- and suggest design strategies for -- new advanced structural materials. Our main objective is thus to develop a hierarchy of methods involving both seamless coupling of information from different scales (electronic to atomic; atomic to microstructural; micro- to macrostructural) and information transfer from one level of hierarchy to the next. As a secondary objective, each methodological advance will also be used to investigate specific phenomena at a single scale. The overall outcome of our work will be a coherent set of computational tools and advances in fundamental understanding of many issues in the thermomechanical performance of materials.

DTIC

Virtual Reality; Design Analysis; Information Transfer

20070004790 Armed Forces Pest Management Board, Washington, DC USA

Ultra Low Volume Dispersal of Insecticides by Ground Equipment

Dec 1999; 39 pp.; In English

Report No.(s): AD-A459546; AFPMB-TIM-13; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Ground Support Equipment; Insecticides; Dispersing

20070004957 Bruckner (John), P.C, Austin, TX, USA

Vertically Aligned Nanostructure Scanning Probe Microscope Tips

Guillorn, M. A.; Ilic, B.; Melechko, A. V.; Merklov, V. I.; Lowndes, D. H.; 10 Nov 03; 50 pp.; In English

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

Patent Info.: Filed Filed 10 Nov 03; US-Patent-Appl-SN-10-716-770

Report No.(s): PB2007-100942; No Copyright; Avail.: CASI: A03, Hardcopy

Methods and apparatus are described for cantilever structures that include a vertically aligned nanostructure, especially vertically aligned carbon nanofiber scanning probe microscope tips. A method includes a method, includes fabricating a cantilever structure having a vertically aligned nanostructure including: forming a doped layer at a first side of a substrate; depositing an etch mask layer on a second side of the substrate; forming a plurality of alignment marks that are coupled to the first side of the substrate; depositing a catalyst nanoparticle at a deterministic site that is coupled to the doped layer; growing the vertically aligned nanostructure at the deterministic site with the catalyst nanoparticle; depositing a first protective layer that surrounds at least a portion of the vertically aligned nanostructure; patterning the first protective layer to define an outline of a cantilever body; transferring the outline of the cantilever body from the first protective layer into the doped layer to form the cantilever body from the doped layer; depositing a second protective layer that coats at least a portion of a surface of the cantilever body; patterning the etch mask layer to define an outline of a relieved volume; transferring the outline of the relieved volume from the etch mask layer into the second side of the substrate to remove the relieved volume from the substrate, where the cantilever body is not removed.

NTIS

Nanostructure (Characteristics); Nanostructures (Devices); Patent Applications; Scanners

20070004969 Whitham, Curtis and Christofferson, PC, Reston, VA, USA

Ionic Solvents Used in Ionic Polymer Transducers, Sensors and Actuators

Bennett, M.; Leo, D.; Wallace, G.; Spinks, G.; 19 Aug 04; 19 pp.; In English

Contract(s)/Grant(s): NSF-CMS0070042

Patent Info.: Filed Filed 19 Aug 04; US-Patent-Appl-SN-10-921-347

Report No.(s): PB2007-100938; No Copyright; Avail.: CASI: A03, Hardcopy

Ionic liquids are incorporated into transducers, actuators or sensors which employ the ionic polymer membranes. The ionic liquids have superior electrochemical stability, low viscosity and low vapor pressure. The transducers, actuators and sensors which utilize ionic polymer membranes solvated with ionic liquids have long term air stability. Superior results are achieved when a conductive powder and ionomer mixture is applied to the ionic polymer membrane to form the electrodes during or after the ionic liquid is imbibed into the ionic polymer membrane.

NTIS

Actuators; Liquids; Patent Applications; Solvents; Transducers

20070005013 Banaras Hindu Univ., Varanasi, India, Rensselaer Polytechnic Inst., Troy, NY, USA

Carbon Nanotube Filter

Ajayan, P. M.; Talapatra, S.; Vajtal, R.; Srivastava, A.; Srivastava, O. N.; 1 Aug 05; 16 pp.; In English

Contract(s)/Grant(s): NSF-DMR-011792

Patent Info.: Filed Filed 1 Aug 05; US-Patent-Appl-SN-11-193-340

Report No.(s): PB2007-103886; No Copyright; Avail.: CASI: A03, Hardcopy

Monolithic, macroscopic, nanoporous nanotube filters are fabricated having radially aligned carbon nanotube walls. The freestanding filters have diameters and lengths up to several centimeters. A single-step filtering process was demonstrated in two important settings: the elimination of multiple components of heavy hydrocarbons from petroleum, a crucial step in post-distillation of crude oil, and the elimination of bacterial contaminants such as Escherichia coli or the nanometer-sized poliovirus from drinking water. All the filtration processes were repeated several times with completely reproducible results. These nanotube filters can be cleaned repeatedly after each filtration process to regain their full filtering efficiency.

NTIS

Carbon Nanotubes; Filters; Fabrication

20070005023 Environmental Protection Agency, Washington, DC USA

Toxic Substances Control Act (TSCA): ASCII Text Data, January 2007, PMN Number to EPA Accession Number Link (Raw Data on CD-ROM)

Jan. 01, 2007; In English

Report No.(s): PB2007-500006; No Copyright; Avail.: National Technical Information Service (NTIS)

The TSCA Chemical Substance Inventory provides chemical identity information for the non-confidential substances on the TSCA Master Inventory File. The datafile contains no TSCA Confidential Business Information. New versions of the TSCA Inventory are issued at approximately six month intervals. The data provided for each chemical substance include the CAS Registry Number, Preferred CA Index Name, molecular formula, and other appropriate information, such as valid chemical names reported by submitters. The entries are in ascending CAS Registry Number order. The PMN Number to EPA Accession Number Link provides a cross-reference of these number for commenced PMNs on the confidential portion of the TSCA Master Inventory File. Neither this cross-reference nor the additional information included is TSCA Confidential Business Information.
NTIS
CD-ROM; Inventories; Texts; Toxicity

20070005024 Texas Univ., Austin, TX, USA
Performance Comparison of Hot Rubber Crack Sealants to Emulsified Asphalt Crack Sealants
Yildirim, Y.; Korkmaz, A.; Prozzi, J.; May 2006; 64 pp.; In English
Report No.(s): PB2007-106110; REPT-0-4061-3; No Copyright; Avail.: CASI: A04, Hardcopy

This is the final report from the Center for Transportation Research on Project 4061. It presents the results, findings, conclusions, and recommendations based on the surveys, lab tests, and information collected on test sections for the 4-year study. Sealing and filling cracks has always been an important consideration in pavement maintenance. Hot rubber asphalt has been the most commonly used material for this purpose, providing good performance in most cases. Some Texas Department of Transportation (TxDOT) districts have been using cold pour asphalt emulsion crack sealants because of the ease of use. However, cold pour crack sealant requires longer setting and curing time, especially in areas of high humidity. The performance history of these cold sealants is not known or not well documented in comparison to the performance of hot pour crack sealants. Furthermore, the cost associated with the use of this material versus hot pour rubber asphalt is not well documented or determined. The intent of this research project is to compare the cost-effectiveness, performance, and lifecycle costs for hot pour rubber asphalt crack sealant and cold pour asphalt emulsion crack sealant. The comparison includes seven different crack and joint sealants: three cold pour and four hot pour. Eight different roads in five districts were selected for comparison of the sealants, for a total of thirty-three different test sections. The survey and field study results indicate that hot pour sealants performed better than cold pour sealants. In addition, hot pour sealants had lower average annual cost values than cold pour sealants. Modifications to the specifications for crack sealants currently used at TxDOT were suggested.
NTIS
Asphalt; Cracks; Pavements; Rubber; Sealers; Sealing

20070005027 Greenlee Winner and Sullivan, P.C., Boulder, CA, USA
High-Throughput Methods for Determining Electron Density Distributions and Structures of Crystals
Lin, D.; Liu, Z. J.; Praissman, J.; Rose, J. P.; Tempel, W.; 26 Aug 05; 47 pp.; In English
Contract(s)/Grant(s): NIH-GM62407
Patent Info.: Filed Filed 26 Aug 05; US-Patent-Appl-SN-11-213-619
Report No.(s): PB2007-103901; No Copyright; Avail.: CASI: A03, Hardcopy

Disclosed are high-throughput methods for determining crystal structures from X-ray diffraction data, for example high-throughput crystal structure determination methods employing flexible, high-throughput modular computational pipelines, such as Bioperl computational pipelines. High-throughput methods for determining crystal structures can be fully or partially automated, and can be fully or partially computer executed. Crystal structure determination methods employing a pipeline interface, work flow manager and/or output parsers can be used to optimize the amount of structural information derived from an X-ray diffraction data set and increase the efficiency of calculating crystal structures from X-ray diffraction data.
NTIS
Crystals; Density Distribution; Electron Density (Concentration)

20070005085 William J. Hughes Technical Center, Atlantic City, NJ, USA, Hi-Tech Systems, Inc., Columbus, GA, USA, Air Force Research Lab., Tyndall AFB, FL, USA
Evaluation of a New Liquid Fire-Extinguishing Agent for Combustible Metal Fires
Bagot, K.; Subbotin, N.; Kalberer, J.; Nov. 2006; 19 pp.; In English
Report No.(s): PB2007-103676; No Copyright; Avail.: CASI: A03, Hardcopy

A new liquid fire-extinguishing agent for combustible metal fires was evaluated. Aircraft rescue fire fighters may confront metal fires, such as magnesium and titanium, in aircraft brake assemblies, landing gear components, aircraft engines, and other structural components of aircraft. A combustible metal on fire could be a possible ignition source or a continuing source of ignition in an aircraft fire. The standard method for extinguishing combustible metal fires consists of using sodium chloride dry powder to smother the burning metal. This evaluation determined the optimum chemical formulation and best extinguishing method using FEM-12 SC in hand-held extinguishers during the Federal Aviation Administration (FAA) Aircraft Rescue and Firefighting (ARFF) Research Program's combustible metal fire-testing protocol. A further evaluation included aquatic-toxicity testing of FEM-12 SC, and the extinguishing performance of FEM-12 SC compared to sodium chloride dry powder in accordance with the parameters set forth in the American National Standards Institute/Underwriters Laboratories Incorporated 711 'Rating and Testing of Fire Extinguishers,' Section 10.2, Magnesium Fire Tests, Section 10.2.28, Magnesium Casting Fire Tests. The tests conducted by the FAA ARFF Research Program determined optimum chemical formulation, FEM-12 SC, and the best extinguishing method using 240 pounds per square inch, high-pressure extinguishers in a straight-stream configuration. The aquatic-toxicity test results showed that FEM-12 SC was tested at 675 parts per million (ppm) median lethal concentration and was within the acceptable accuracy range of greater than 500 ppm. The extinguishing performance comparison results showed that sodium chloride extinguished a magnesium fire in an average of 102 seconds, twice as fast as FEM-12 SC. However, it created a potential long-term fire hazard due to its inability to cool the metal, which could redevelop into a fire if the sodium chloride-covered metal was disturbed. FEM-12 SC provided better cooling than sodium chloride so that the magnesium could be handled with bare hands within minutes of extinguishment. However, when FEM-12 SC came in direct contact with the burning magnesium, violent flare ups of the fire and flying magnesium sparks created potential fire hazards. Once the fire was extinguished, the fire hazards were eliminated.
NTIS
Combustion; Evaluation; Fire Extinguishers; Fires; Performance Tests

20070005094 Delaware Univ., Newark, DE, USA
Novel Hydrogels and Uses Thereof
Schneider, J. P.; Pochan, D. J.; 28 Jul 04; 59 pp.; In English
Contract(s)/Grant(s): NIH-1-P20-RR-17716-01
Patent Info.: Filed Filed 28 Jul 04; US-Patent-Appl-SN-10-900-344
Report No.(s): PB2007-103860; No Copyright; Avail.: CASI: A04, Hardcopy

The present invention provides novel hydrogels and methods of making and using such hydrogels. The present invention provides hydrogels that may be formed by the self-assembly of peptides in solution. Such self-assembly may be brought about by a change in one or more characteristics of the solution. Characteristics of the solution that may be changed include pH, ionic strength, temperature, and concentration of one or more specific ions. In addition, hydrogels of the invention may be disassembled by changing one or more characteristic of the hydrogel such as pH, ionic strength, temperature, and concentration of one or more specific ions.
NTIS
Gels; Patent Applications; Peptides; Polymers

20070005125 Lawrence Livermore National Lab., Livermore, CA USA
Different Precursor Populations Revealed by Microsciouc Studies of Bulk Damage in KDP and DKDP Crystals
DeMange, P.; Negres, R. A.; Radousky, H. B.; Demos, S. G.; Nov. 04, 2005; 14 pp.; In English
Report No.(s): DE2006-886666; No Copyright; Avail.: Department of Energy Information Bridge

We present experimental results aiming to reveal the relationship between damage initiating defect populations in KDP and DKDP crystals under irradiation at different wavelengths. Our results indicate that there is more than one type of defects leading to damage initiation, each defect acting as damage initiators over a different wavelength range. Results showing disparities in the morphology of damage sites from exposure at different wavelengths provides additional evidence for the presence of multiple types of defects responsible for damage initiation.
NTIS
Crack Initiation; Crystals; Damage; Defects; Populations

20070005305 Naval Research Lab., Washington, DC USA
Theoretical Considerations Governing the Dehydration of Fuels by Gas Blowing
Krynitsky, John A; Feb 1957; 21 pp.; In English
Contract(s)/Grant(s): NA-350-062; Proj-TED-NRL-042

Report No.(s): AD-A459937; NRL-C01-01; XB-NRL/MR/6100; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459937; Avail.: CASI: A03, Hardcopy

The theory governing the removal of free and dissolved water by gas blowing is discussed and equations for pre-dieting the performance of continuous counter current flow drying units are developed using a concept of ‘effective theoretical plates.’ From the general equation derived, it is shown that the performance of any particular fuel drying unit is dependent on the efficiency of the drying tower employed (effective number of theoretical plates), the ratio of the rates of gas to fuel flow used, the dryness of the inlet gas, the moisture content of the entering fuel and the temperature of operation. A number of solutions applicable to the dehydration of JP-5 fuel under a variety of operating conditions are included to demonstrate the relative importance of the above parameters and to illustrate the type of performance possible.

DTIC

Blowing; Dehydration; Fuels; Gases; JP-5 Jet Fuel

20070005337 Naval Research Lab., Washington, DC USA

Passive Badge Assessment for Long-Term, Low-Level Air Monitoring on Submarines: VOC Badge Validation

Williams, Kimberly P; Rose-Pehrsson, Susan L; Kidwell, David A; Dec 18, 2006; 23 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459989; NRL/MR/6180-06-9016; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459989; Avail.: CASI: A03, Hardcopy

Passive badge monitors for benzene, toluene, and xylene detection (cumulatively) were tested for analyte-specific air analysis onboard U.S. Navy (USN) nuclear submarines. Long-term sampling efficiency was evaluated for a 28-day period by comparing the response of the passive badge to an active tube sampling method. The badges and tubes were exposed to benzene, toluene, and xylene vapors at concentrations ranging from 0.33 to 1.98 ppm, resulting in time-weighted-average exposures ranging from 47-283 ppb. High-and low-level concentrations were tested to examine the response range of the badge. The badges continued to accumulate the analyte for 28 days, with no change in sampling rate over time. Badge results appeared to be stable and consistent, but were different than the results observed from tubes. Accumulation of benzene onto badges was consistently higher than accumulation onto tubes (+24%), while the badge response to toluene and xylene was lower than that of the tubes (-40%, -49%). A correction factor may need to be applied to the analytical results to obtain more accurate, quantitative data. Appendixes include raw data in table form for active sampling tubes and passive sampling badges; tube/badge comparisons at high-level and low-level exposures; and tube/badge comparisons (replacement badges) at high-level and low-level exposures.

DTIC

Air Quality; Environmental Monitoring; Sampling; Submarines; Test Equipment; Vapors; Volatile Organic Compounds

24
COMPOSITE MATERIALS

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

20070003583 NASA Glenn Research Center, Cleveland, OH, USA

Carbon Materials Metal/Metal Oxide Nanoparticle Composite and Battery Anode Composed of the Same

Hung, Ching-Cheh, Inventor; August 22, 2006; 9 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 10 Jun. 2003; US-Patent-7,094,499; US-Patent-Appl-SN-457433; NASA-Case-LEW-17309-01; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003583; Avail.: CASI: A02, Hardcopy

A method of forming a composite material for use as an anode for a lithium-ion battery is disclosed. The steps include selecting a carbon material as a constituent part of the composite, chemically treating the selected carbon material to receive nanoparticles, incorporating nanoparticles into the chemically treated carbon material and removing surface nanoparticles from an outside surface of the carbon material with incorporated nanoparticles. A material making up the nanoparticles alloys with lithium.

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

Anodes; Metal Oxides; Composite Materials; Nanoparticles; Lithium Batteries; Carbon

20070003809 Missouri Univ., Rolla, MO USA

Functionally Graded Shape Memory Alloy Composites Optimized for Passive Vibration Control

Nov 20, 2006; 23 pp.; In English

Contract(s)/Grant(s): W911NF-06-1-0189

Report No.(s): AD-A459593; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Shape Memory Alloys; Vibration Damping; Composite Materials

20070004792 NASA Langley Research Center, Hampton, VA, USA

Materials Development for Hypersonic Flight Vehicles

Glass, David E.; Dirling, Ray; Croop, Harold; Fry, Timothy J.; Frank, Geoffrey J.; 2006; 13 pp.; In English; 14th AIAA/AHI International Space Planes and Hypersonics Systems and Technologies Conference, 6-9 Nov. 2006, Canberra, Australia; Original contains color illustrations

Contract(s)/Grant(s): WBS 685771.01.04.9SYO.01

Report No.(s): AIAA Paper 2006-8122; Copyright; Avail.: CASI: A03, Hardcopy

The DARPA/Air Force Falcon program is planning to flight test several hypersonic technology vehicles (HTV) in the next several years. A Materials Integrated Product Team (MIPT) was formed to lead the development of key thermal protection system (TPS) and hot structures technologies. The technologies being addressed by the MIPT are in the following areas: 1) less than 3000 F leading edges, 2) greater than 3000 F refractory composite materials, 3) high temperature multi-layer insulation, 4) acreage TPS, and 5) high temperature seals. Technologies being developed in each of these areas are discussed in this paper.

Author

Flight Tests; Hypersonic Vehicles; Composite Materials; Technology Utilization; Launch Vehicles; Fabrication

20070004906 NASA Glenn Research Center, Cleveland, OH, USA

Probabilistic Design of Composite Structures

Chamis, Christos C.; December 2006; 13 pp.; In English; ICCES07: International Conference on Computational and Experimental Engineering and Sciences, 3-8 Jan. 2007, Miami Beach, FL, USA; Original contains black and white illustrations

Contract(s)/Grant(s): WBS 732.759.03.01.03.01

Report No.(s): NASA/TM-2006-214660; E-15788; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004906; Avail.: CASI: A03, Hardcopy

A formal procedure for the probabilistic design evaluation of a composite structure is described. The uncertainties in all aspects of a composite structure (constituent material properties, fabrication variables, structural geometry, and service environments, etc.), which result in the uncertain behavior in the composite structural responses, are included in the evaluation. The probabilistic evaluation consists of: (1) design criteria, (2) modeling of composite structures and uncertainties, (3) simulation methods, and (4) the decision-making process. A sample case is presented to illustrate the formal procedure and to demonstrate that composite structural designs can be probabilistically evaluated with accuracy and efficiency.

Author

Structural Design; Composite Structures; Design Analysis

20070004912 Michigan Univ., Ann Arbor, MI USA

Innovative Mechanism-Based Textile Composite Damage Modeling Basing on a Nonlinear Fiber Model and Enhanced Homogenization Method

Aug 31, 2006; 47 pp.; In English

Contract(s)/Grant(s): W911NF-05-1-0501

Report No.(s): AD-A459497; F013433; DRDA-05-4171; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Textiles; Damage; Homogenizing; Composite Materials

20070004977 Licatla and Tyrrell, P.C., Marlton, NJ, USA

Polymeric Bioresorbable Composites Containing an Amorphous Calcium Phosphate Polymer Ceramic for Bone Repair and Replacement

Laurencin, C. T.; Ambrosio, A. M.; Sahota, J.; 14 Mar 02; 5 pp.; In English

Contract(s)/Grant(s): NSF-NSG-BES9817872

Patent Info.: Filed Filed 14 Mar 02; US-Patent-Appl-SN-10-469 617
Report No.(s): PB2007-100898; No Copyright; Avail.: CASI: A01, Hardcopy

A bioresorbable composite of a non-crystalline calcium phosphate ceramic synthesized within an encapsulating microspheres of bioresorbable polymeric material for use in bone repair and replacement is provided. Also provides are methods for producing these composites as well as porous, 3-dimensional scaffold produced by sintering together microspheres of this bioresorbable composite.

NTIS

Amorphous Materials; Bones; Calcium Phosphates; Ceramics; Patent Applications; Polymers; Replacing

20070004979 Georgia Tech Research Inst., Atlanta, GA, USA

Macroscopic Fiber Comprising Single-Wall Carbon Nanotubes and Acrylonitrile-Based Polymer and Process for Making the Same

Veedu, S. T.; Kumar, S.; 22 Nov 04; 21 pp.; In English
Contract(s)/Grant(s): ONR-N00014-01-0657; AFOSR-F49620-00-1-0147
Patent Info.: Filed Filed 22 Nov 04; US-Patent-Appl-SN-10-994 892
Report No.(s): PB2007-100897; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention relates to a high modulus macroscopic fiber comprising single-wall carbon nanotubes (SWNT) and an acrylonitrile-containing polymer. In one embodiment, the macroscopic fiber is a drawn fiber having a cross-sectional dimension of at least 1 micron. In another embodiment, the acrylonitrile polymer-SWNT composite fiber is made by dispersing SWNT in a solvent, such as dimethyl formamide or dimethyl acetamide, admixing an acrylonitrile-based polymer to form a generally optically homogeneous polyacrylonitrile polymer-SWNT dope, spinning the dope into a fiber, drawing and drying the fiber. Polyacrylonitrile/SWNT composite macroscopic fibers have substantially higher modulus and reduced shrinkage versus a polymer fiber without SWNT. A polyacrylonitrile/SWNT fiber containing 10 wt % SWNT showed over 100% increase in tensile modulus and significantly reduced thermal shrinkage compared to a control fiber without SWNT. With 10 wt % SWNT, the glass transition temperature of the polymer increased by more than 40.degree. C.

NTIS

Acrylonitriles; Carbon Fibers; Carbon Nanotubes; Nitrogen Polymers

20070005097 Mainstream Engineering Corp., Rockledge, FL, USA

Nanotube Composites and Methods for Producing

Saringe, R. P.; Back, D. D.; Meyer, J. A.; 27 Jul 04; 15 pp.; In English
Contract(s)/Grant(s): NSWC-N00164-03-C-6023; NSWC-N0016703-C-0064
Patent Info.: Filed Filed 27 Jul 04; US-Patent-Appl-SN-10-898-933
Report No.(s): PB2007-103859; No Copyright; Avail.: CASI: A03, Hardcopy

A method for producing a carbon nanotube composite, in which carbon nanotubes are grown on a support substrate and metal catalyst. The carbon nanotubes, support substrate, and catalyst are combined in at least a partially unpurified form with a matrix material.

NTIS

Carbon Nanotubes; Composite Materials; Nanotubes; Patent Applications

20070005117 Oak Ridge National Lab., TN USA, Pittsburgh Univ., PA, USA

Fracture Toughness and Strength in a New Class of Bainitic Chromium-Tungsten Steels

Jun. 2006; 48 pp.; In English
Report No.(s): DE2006-886702; ORNL/TM-2006/44; No Copyright; Avail.: Department of Energy Information Bridge

This project dealt with developing an understanding of the toughening and strengthening mechanism for a new class of Fe-3Cr-W(V) steels developed at Oak Ridge National Laboratory (ORNL) in collaboration with Nooter Corporation and other industrial partners. The new steel had 50% higher tensile strength up to 650DGC than currently used steels and the potential for not requiring any postweld heat treatment (PWHT) and for reducing equipment weight by 25%. This project was closely related to the Nooter project described in the report Development of a New Class of Fe-3Cr-W(V) Ferritic Steels for Industrial Process Applications (ORNL/TM-2005/82). The project was carried out jointly by the University of Pittsburgh and ORNL. The University of Pittsburgh carried out fracture toughness measurements and microstructural analysis on base metal and welded plates prepared at ORNL.

NTIS

Bainitic Steel; Chromium Steels; Composite Materials; Fracture Strength; Steels; Tungsten

20070005301 Composite Technology Development, Inc., Lafayette, CO USA
Effect of Inclusion Morphology on the Coefficient of Thermal Expansion in Filled Epoxy Matrix (Preprint)
Mallick, Kaushik; Cronin, John; Arzberger, Steven; Apr 2006; 13 pp.; In English
Contract(s)/Grant(s): HQ0006-04-C-7070
Report No.(s): AD-A459928; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459928; Avail.: CASI: A03, Hardcopy

The paper presents material development research performed at Composite Technology Development, Inc. towards optimization of the design for linerless composite cryogenic tanks. In a cryogenic composite tank, large thermal strains develop through the thickness of the tank laminate due to the mismatch in the coefficient of thermal expansion of adjacent plies with different fiber orientations. These thermal strains are primarily caused by the thermal contraction of the matrix material. Excessive thermal strains can cause microcracks in the matrix and inter-ply delamination, leading to leakage of the fluid contained by the tank. Reduction of the thermal expansion of the matrix is viewed as an essential design tool for optimizing these tanks. Addition of inclusions that are much stiffer than the matrix is an effective means to reduce thermal expansion of the matrix for the composite, as long as it doesn't compromise the toughness. The paper presents an analytical scheme to predict the effective thermal expansion properties of the filled matrix with embedded inclusions and investigates the effect of inclusion morphology, shape and aspect ratio on the same. The analytical predictions are compared with actual test results of thermal expansion measured for the matrix. The inductions and trends are being used to select the best material and to improve their processing to achieve the most optimized cryogenic tank design.
DTIC
Composite Materials; Cryogenics; Epoxy Matrix Composites; Morphology; Thermal Expansion

25
INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY

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

20070003579 NASA Kennedy Space Center, Cocoa Beach, FL, USA
Concentration of Hydrogen Peroxide
Parrish, Clyde F., Inventor; October 17, 2006; 6 pp.; In English; Original contains black and white illustrations
Patent Info.: Filed 11 May 2004; US-Patent-7,122,166; US-Patent-Appl-SN-845607; NASA-Case-KSC-12666; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003579; Avail.: CASI: A02, Hardcopy

Methods for concentrating hydrogen peroxide solutions have been described. The methods utilize a polymeric membrane separating a hydrogen peroxide solution from a sweep gas or permeate. The membrane is selective to the permeability of water over the permeability of hydrogen peroxide, thereby facilitating the concentration of the hydrogen peroxide solution through the transport of water through the membrane to the permeate. By utilizing methods in accordance with the invention, hydrogen peroxide solutions of up to 85% by volume or higher may be generated at a point of use without storing substantial quantities of the highly concentrated solutions and without requiring temperatures that would produce explosive mixtures of hydrogen peroxide vapors.
Official Gazette of the U.S. Patent and Trademark Office
Hydrogen Peroxide; Concentration (Composition); Methodology

20070003717 Illinois Univ. at Urbana-Champaign, Urbana, IL USA
Investigating the Interface of Superhydrophobic Surfaces in Contact With Water
Jun 11, 2005; 8 pp.; In English
Contract(s)/Grant(s): DAAD19-03-1-0227
Report No.(s): AD-A459324; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available
Water; Hydrophobicity; Interfaces; Surface Properties

20070003759 Iowa State Univ. of Science and Technology, Ames, IA USA
Efficient Execution of Electronic Structure Calculations on SMP Clusters
Ustemirov, N.; January 2006; 46 pp.; In English
Report No.(s): DE2006-888952; No Copyright; Avail.: National Technical Information Service (NTIS)

Applications augmented with adaptive capabilities are becoming common in parallel computing environments. For large-scale scientific applications, dynamic adjustments to a computationally-intensive part may lead to a large pay-off in facilitating efficient execution of the entire application while aiming at avoiding resource contention. Application-specific knowledge, often best revealed during the run-time, is required to initiate and time these adjustments. In particular, General Atomic and Molecular Electronic Structure System (GAMESS) is a program for ab initio quantum chemistry that places significant demands on the high-performance computing platforms. Certain electronic structure calculations are characterized by high consumption of a particular resource, such as CPU, main memory, or disk I/O. This may lead to resource contention among concurrent GAMESS jobs and other programs in the dynamically changing environment. Thus, it is desirable to improve GAMESS calculations by means of dynamic adaptations. In this thesis, we show how an application- or algorithm-specific knowledge may play a significant role in achieving this goal. The choice of implementation is facilitated by a module-driven middleware easily integrated with GAMESS that assesses resource consumption and invokes GAMESS adaptations to the system environment.
NTIS
Electronic Structure; Quantum Chemistry

20070003762 Iowa State Univ. of Science and Technology, Ames, IA USA
Structure and Function Evolution of Thiolate Monolayers on Gold
Edwards, G. A.; January 2005; 117 pp.; In English
Report No.(s): DE2006-888936; No Copyright; Avail.: Department of Energy Information Bridge

The use of n-alkanethiolate self-assembled monolayers on gold has blossomed in the past few years. These systems have functioned as models for common interfaces. Thiolate monolayers are ideal because they are easily modified before or after deposition. The works contained within this dissertation include interfacial characterization (inbred reflection absorption spectroscopy, ellipsometry, contact angle, scanning probe microscopy, and heterogeneous electron-transfer kinetics) and various modeling scenarios. The results of these characterizations present ground-breaking insights into the structure, function, and reproducible preparation of these monolayers. Surprisingly, three interfacial properties (electron-transfer, contact angle, and ellipsometry) were discovered to depend directly on the odd-even character of the monolayer components. Molecular modeling was utilized to investigate adlayer orientation, and suggests that these effects are adlayer structure specific. Finally, the electric force microscopy and theoretical modeling investigations of monolayer samples are presented, which show that the film dielectric constant, thickness, and dipole moment directly affect image contrast. In addition, the prospects for utilization of this emerging technique are outlined.
NTIS
Gold; Thiols; Molecular Structure

20070003763 Iowa State Univ. of Science and Technology, Ames, IA USA
Rare-earth Transition-Metal Intermetallics: Structure-Bonding-Property Relationships
Han, M. K.; January 2006; 233 pp.; In English
Report No.(s): DE2006-888946; No Copyright; Avail.: Department of Energy Information Bridge

The purpose of this thesis is to explore novel rare-earth, transition metal compounds and to investigate their structure and bonding and how these influence their properties. We have focused on the synthesis, characterization and electronic structure investigations, as well as physical properties of ternary rare-earth Fe-rich intermetallics. The main investigatory techniques used in this thesis are powder and single crystal X-ray diffractions, magnetic properties measurements, and electronic structure calculations. X-ray diffraction is a powerful technique which can provide information about atomic ordering and bonding within the structure. In addition to careful crystallography, electronic structure calculations are an essential too1 for understanding the relationship between structure and chemical bonding in these compounds. Useful theoretical tools are the energy density of states (DOS), crystal orbital Hamilton population (COHP) and the electronic band structure. Manipulations of the density of states allow classification of bonding types and assignment of electron density to various atoms in a material.
NTIS
Bonding; Electronic Structure; Intermetallics; Rare Earth Elements

20070003764 Iowa State Univ. of Science and Technology, Ames, IA USA
Biological Applications and Transmission Electron Microscopy Investigation of Mesoporous Silica Nanoparticles
Trewyn, B. G.; January 2006; 151 pp.; In English
Report No.(s): DE2006-888950; No Copyright; Avail.: Department of Energy Information Bridge

The research presented and discussed within involves the development of novel biological applications of mesoporous silica nanoparticles (MSN) and an investigation of mesoporous material by transmission electron microscopy Mesoporous silica nanoparticles organically functionalized shown to undergo endocytosis in cancer cells and drug release from the pores was controlled intracellularly and intercellularly. Transmission electron microscopy investigations demonstrated the variety of morphologies produced in this field of mesoporous silica nanomaterial synthesis. A series of room-temperature ionic liquid (RTIL) containing mesoporous silica nanoparticle (MSN) materials with various particle morphologies, including spheres, ellipsoids, rods, and tubes, were synthesized. By changing the RTIL template, the pore morphology was tuned from the MCM-41 type of hexagonal mesopores to rotational moire type of helical channels, and to wormhole-like porous structures. These materials were used as controlled release delivery nanodevices to deliver antibacterial ionic liquids against Escherichia coli KZ2.
NTIS
Nanoparticles; Silicon Dioxide; Transmission Electron Microscopy

20070003765 Iowa State Univ. of Science and Technology, Ames, IA USA
Electron Transfer Reactivity Patterns at Chemically Modified Electrodes: Fundamentals and Application to the Optimization of Redox Recycling Amplification Systems
Bergren, A. J.; January 2005; 213 pp.; In English
Report No.(s): DE2006-888934; No Copyright; Avail.: Department of Energy Information Bridge

Electroanalytical chemistry is often utilized in chemical analysis and fundamental studies. Important advances have been made in these areas since the advent of chemically modified electrodes: the coating of an electrode with a chemical film in order to impart desirable, and ideally, predictable properties. These procedures enable the exploitation of unique reactivity patterns. This dissertation presents studies that investigate novel reaction mechanisms at self-assembled monolayers on gold. In particular, a unique electrochemical current amplification scheme is detailed that relies on a selective electrode to enable a reactivity pattern that results in regeneration of the analyte (redox recycling). This regenerating reaction can occur up to 250 times for each analyte molecule, leading to a notable enhancement in the observed current. The requirements of electrode selectivity and the resulting amplification and detection limit improvements are described with respect to the heterogeneous and homogeneous electron transfer rates that characterize the system.
NTIS
Amplification; Electrodes; Electron Transfer; Oxidation-Reduction Reactions; Reactivity; Recycling

20070003768 University of Southern California, Los Angeles, CA, USA
Novel Anionic Clay Adsorbents for Boiler-Blow Down Waters Reclaim and Reuse. (Final Report, September 1, 2004-August 31, 2005)
Sahimi, M.; Tsotsis, T. T.; Dec. 2005; 61 pp.; In English
Report No.(s): DE2006-888921; No Copyright; Avail.: National Technical Information Service (NTIS)

U.S. electric utilities are a large user of water. New regulations to diminish the effect of power generation on aquatic life will mean, that Utilities will have to retrofit from the once-through cooling technology, to recirculating cooling towers, and to reclaim/reuse discharged water throughout the power-plant (e.g., boiler blow-down water). Concerns exist today, in particular, about heavy metals, such as Hg, As and Se, found in many of the power-plant effluents. Most of these streams fall today under the category of high volume, too clean to clean effluents. They require highly efficient treatment techniques, particularly for the removal of trace-level metal contaminants. Little emphasis, so far, has been placed on such discharges. The focus of this project is on treating and reusing such effluents, particularly on dealing with Se and As impacted boiler blow-down streams. Our goal is to study the utilization of novel anionic clay sorbents for treating and reclaiming/reusing power-plant effluents, in particular, boiler blow-down waters containing heavy metals, such as As and Se.
NTIS
Adsorbents; Anions; Blowing; Boilers; Clays; Negative Ions

20070003769 Lawrence Livermore National Lab., Livermore, CA USA
Methods to Calculate Corrosion Rates for Alloy 22 from Polarization Resistance Experiments
Wong, L. L.; Martin, S. I.; Rebak, R. B.; Jul. 2006; 10 pp.; In English
Report No.(s): DE2006-888865; No Copyright; Avail.: Department of Energy Information Bridge

The general corrosion rate may be measured using immersion tests or electrochemical tests. Electrochemical tests are fast and can be used for a rapid screening of environmental effects such as temperature and electrolyte composition.

Electrochemical tests are described in ASTM standards G 59 and G 102. The basis of these tests is to calculate the resistance to polarization in a voltage vs. current plot and to convert these values to corrosion rates using Faraday's law. Commercial software can calculate the corrosion rate based on inputs from the operator. This paper discusses three ways of calculating the corrosion rate (Methods 1, 2, and 3) based on a fixed set of acquired data of voltage vs. current. It is concluded that the way the corrosion rate is calculated does not greatly impact the absolute value of the corrosion rate.
NTIS
Corrosion; Corrosion Resistance; Nickel Alloys; Polarization

20070003771 Lawrence Livermore National Lab., Livermore, CA USA, Kobe Steel Ltd., Japan
Comparative Corrosion Behavior of Two Palladium-Containing Titanium Alloys
Lian, T.; Yashiki, T.; Nakayama, T.; Nakanishi, T.; Rebak, R. B.; Jul. 2006; 9 pp.; In English
Report No.(s): DE2006-888858; No Copyright; Avail.: Department of Energy Information Bridge

The ASTM standard B 265 provides the requirements for the chemical composition of titanium (Ti) alloys. It is planned to use corrosion resistant and high strength titanium alloys to fabricate the drip shield at the proposed Yucca Mountain Repository. Titanium grade (Gr) 7 (R52400) and other Ti alloys are currently being characterized for this application. Ti Gr 7 contains 0.15% Palladium (Pd) to increase its corrosion performance. In this article we report results on the comparative short term corrosion behavior of Ti Gr 7 and a Ruthenium (Ru) containing alloy (Ti Gr 33). Ti Gr 33 also contains a small amount of Pd. Limited electrochemical testing such as polarization resistance and cyclic potentiodynamic curves showed that. both alloys have a similar corrosion behavior in the tested environments.
NTIS
Corrosion; Corrosion Resistance; Palladium; Palladium Alloys; Titanium Alloys

20070003772 Fluor Daniel Hanford, Inc., Richland, WA, USA
Action Concentration for Mixtures of VOCs, Methane and Hydrogen
Marusich, R. M.; Jul. 2006; 26 pp.; In English
Report No.(s): DE2006-888828; HNF-29785; No Copyright; Avail.: Department of Energy Information Bridge

Waste containers may contain volatile organic compounds (VOCs), methane, hydrogen and possibly propane. These constituents may occur individually or in mixtures. Determining if a waste container contains a flammable concentration of flammable gases and vapors (from VOCs) is important to the safety of the handling, repackaging and shipping activities. This report provides the basis for determining the flammability of mixtures of flammable gases and vapors. The concentration of a mixture that is at the lowest flammability limit for that mixture is called the action concentration. The action concentration can be determined using total VOC concentrations or actual concentration of each individual VOC. The concentrations of hydrogen and methane are included with the total VOC or individual VOC concentration to determine the action concentration. Concentrations below this point are not flammable. Waste containers with gas/vapor concentrations at or above the action concentration are considered flammable.
NTIS
Hydrogen; Methane; Organic Compounds

20070004664 Auburn Univ., AL USA
Enzyme-Encapsulated Silica Monolayers for Rapid Functionalization of a Gold Surface PREPRINT
Jul 2006; 9 pp.; In English
Contract(s)/Grant(s): F08637-03-C-6006; Proj-4915
Report No.(s): AD-A459758; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available
Enzymes; Gold; Silicon Dioxide; Amorphous Materials

20070004668 Army Research Lab., Aberdeen Proving Ground, MD USA
Simulation of Organic Magnetic Resonance Force Microscopy Experiments
Dec 2006; 30 pp.; In English
Report No.(s): AD-A459753; ARL-TR-4016; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Microscopy; Simulation; Organic Materials; Signal to Noise Ratios

20070004703 Case Western Reserve Univ., Cleveland, OH USA

Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository

January 2006; 26 pp.; In English

Report No.(s): DE2006-886041; No Copyright; Avail.: National Technical Information Service (NTIS)

Corrosion is a primary determinant of waste package performance at the proposed Yucca Mountain Repository: (1) the most likely degradation process; (2) controls the delay time for radionuclide transport from the waste package; and (3) determines when packages will be penetrated and the shape size and distribution of those penetrations. In this presentation a framework for the analysis of localized corrosion is presented and demonstrated for a scenario: (1) water chemistry of mixed salt solutions (sodium chloride-potassium nitrate); and (2) time-temperature-relative humidity profiles for a hot, mid and cool temperature waste package.

NTIS

Corrosion; Mountains; Radioactive Wastes; Waste Management

20070004704 Lawrence Livermore National Lab., Livermore, CA USA, Pacific Northwest National Lab., Richland, WA, USA

Thermodynamics of Neptunium(V) Fluoride and Sulfate at Elevated Temperatures

Rao, L.; Tian, G.; Xia, Y.; Friese, J. I.; January 2006; 10 pp.; In English

Report No.(s): DE2006-886039; No Copyright; Avail.: Department of Energy Information Bridge

Complexation of neptunium(V) with fluoride and sulfate at elevated, temperatures was studied by microcalorimetry. Thermodynamic parameters, including the equilibrium constants and enthalpy of protonation of fluoride and sulfate, and the enthalpy of complexation between Np(V) and fluoride and sulfate at 25-70 C were determined. Results show that the complexation of Np(V) with fluoride and sulfate is endothermic and that the complexation is enhanced by the increase in temperature--a threefold increase in the stability constants of NpO(sub 2)F(aq) and NpO(sub 2)SO(sub 4)(sup -) as the temperature is increased from 25 to 70 C.

NTIS

Fluorides; High Temperature; Neptunium; Sulfates; Thermodynamics

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20070004728 California Univ., Berkeley, CA USA

Dynamical Study of Guest-Host Orientational Interaction in Liquid Crystalline Materials

Truong, T. V.; Oct. 2005; 118 pp.; In English

Report No.(s): DE2006-888975; No Copyright; Avail.: Department of Energy Information Bridge

Guest-host interaction has long been a subject of interest in many disciplines. Emphasis is often on how a small amount of guest substance could significantly affect the properties of a host material. This thesis describe our work in studying a guest-host effect where dye-doping of liquid crystalline materials greatly enhances the optical Kerr nonlinearity of the material. The dye molecules, upon excitation and via intermolecular interaction, provides an extra torque to reorient the host molecules, leading to the enhanced optical Kerr nonlinearity. We carried out a comprehensive study on the dynamics of the photoexcited dyedoped liquid crystalline medium. Using various experimental techniques, we separately characterized the dynamical responses of the relevant molecular species present in the medium following photo-excitation, and thus were able to follow the transient process in which photo-excitation of the dye molecules exert through guest-host interaction a net torque on the host LC material, leading to the observed enhanced molecular reorientation.

NTIS

Crystallinity; Liquid Crystals; Orientation; Molecular Interactions

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20070004732 Department of Energy, Washington, DC USA

Adaptive Sampling and Analysis Programs (ASAPs)

Aug. 2001; 34 pp.; In English

Report No.(s): DE2006-885502; DOE/EM-0592; No Copyright; Avail.: National Technical Information Service (NTIS)

Table of Contents: Summary; Technology description; Performance; Technology applicability and alternatives; Cost; Regulatory and policy issues; Lessons learned and Appendices.

NTIS

Contamination; Hazardous Materials; Sampling

20070004903 NASA Glenn Research Center, Cleveland, OH, USA

Characterization of Lubricants on Ball Bearings by FT-IR Using an Integrating Sphere

Street, K. W.; Pepper, S. V.; Wright, A. A.; Grady, B.; January 2007; 15 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): WBS 22-066-30-04

Report No.(s): NASA/TM-2007-214472; E-15764; Copyright; Avail.: CASI: A03, Hardcopy

Fourier Transform-Infrared reflectance microspectroscopy has been used extensively for the examination of coatings on nonplanar surfaces such as ball bearings. While this technique offers considerable advantages, practical application has many drawbacks, some of which are easily overcome by the use of integrating sphere technology. This paper describes the use of an integrating sphere for the quantification of thin layers of lubricant on the surface of ball bearings and the parameters which require optimization in order to obtain reliable data. Several applications of the technique are discussed including determination of lubricant load on 12.7 mm steel ball bearings and the examination of degraded lubricant on post mortem specimens.

Author

Microanalysis; Infrared Spectroscopy; Lubricants; Ball Bearings; Reflectance; Fourier Transformation

20070004986 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, California Univ., Berkeley, CA USA

Graphene Layer Growth: Collision of Migrating Five-Member Rings

Whitesides, R.; Kollias, A. C.; Domin, D.; Lester, W. A.; Frenklach, M.; Aug. 2006; 27 pp.; In English

Report No.(s): DE2006-889313; No Copyright; Avail.: Department of Energy Information Bridge

A reaction pathway is explored in which two cyclopenta groups combine on the zigzag edge of a graphene layer. The process is initiated by H addition to a five-membered ring, followed by opening of that ring and the formation of a six-membered ring adjacent to another fivemembered ring. The elementary steps of the migration pathway are analyzed using density functional theory to examine the region of the potential energy surface associated with the pathway. The calculations are performed on a substrate modeled by the zigzag edge of tetracene. Based on the obtained energetics, the dynamics of the system are analyzed by solving the energy transfer master equations. The results indicate energetic and reaction-rate similarity between the cyclopenta combination and migration reactions. Also examined in the present study are desorption rates of migrating cyclopenta rings which are found to be comparable to cyclopenta ring migration.

NTIS

Collisions; Combustion; Energy Transfer; Migration; Soot

20070005118 Department of Energy, Washington, DC USA

Alkaline Electrolysis. Final Technical Report

January 2006; 28 pp.; In English

Report No.(s): DE2006-886689; No Copyright; Avail.: National Technical Information Service (NTIS)

Hydrogen is an attractive fuel for mobile and stationary applications because it generates only water when reacted. However, many methods of producing hydrogen generate CO2 and other emissions. One way to produce hydrogen with no emissions is to electrolyze water. If the electricity source used to power the electrolyzer does not generate CO2, then the entire cycle of energy production and consumption can be free of greenhouse gas generation. To date, electrolysis has not been the preferred method for large scale hydrogen production because it is more costly than reforming. Costs for electrolysis hydrogen are typically over $8 per kilogram, while hydrogen made by large scale steam methane reformers may cost less than $2 per kilogram. A key aspect of the Department of Energys HFCIT (Hydrogen Fuel Cell Infrastructure Technology) program is to make the environmental benefits of electrolysis hydrogen possible by reducing the price of electrolysis hydrogen to under $3 per kg. In this project, GE developed electrolyzer stack technologies to meet DOEs goals for low cost electrolysis hydrogen. The main barrier to meeting the targets for electrolyzer cost was in stack assembly and construction. GEs invention of a single piece or monolithic plastic electrolyzer stack reduces these costs considerably. In addition, GE developed low cost cell electrodes using a novel application of metal spray coating technology. Bench scale stack testing and cost modeling indicates that the DOE targets for stack capital cost and efficiency can be met by full-scale production of industrial electrolyzers incorporating GEs stack technology innovations. A multicell monolithic plastic stack was demonstrated to DOE HFCIT Production Team leader Peter Devlin on 15 April 2005. This 5-cell operating stack and system exceeds the specified project goal of a 3-cell bench scale stack. Utility customers, for whom capital cost is the primary driver of hydrogen cost, have been identified as early adopters of the technology. The GE research team quantified the performance targets necessary to meet the needs of these customers and developed a strategy to meet these needs at capital cost targets consistent with the hydrogen cost

goals set by DOE. Achieving these capital cost targets is also critical for meeting the needs of the distributed and central hydrogen production scenarios detailed by the H2A program.
NTIS
Electrolysis; Fuels; Hydrogen

20070005343 Air Force Research Lab., Hanscom AFB, MA USA
Aluminum Nitride Substrate Growth by Halide Vapor Transport Epitaxy
Bliss, D F; Tassev, V L; Weyburne, D; Bailey, J S; Jan 31, 2003; 7 pp.; In English
Contract(s)/Grant(s): Proj-4916
Report No.(s): AD-A460001; AFRL-SN-HS-TP-2003-1022; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460001; Avail.: CASI: A02, Hardcopy

High-quality AlN layers with thickness up to 50 micrometers have been grown by HVTE at growth rates up to 60 micrometers/h at deposition temperatures of 1000-1100 degrees C in the pressure range of 50-760 Torr. The HVT process uses an aluminum chloride amine adduct as the aluminum source and ammonia for the nitrogen. This new technique eliminates the main difficulties of the conventional HVPE growth, where aluminum oxidation and the strong reactivity of aluminum chloride with quartz create the potential for oxygen contamination. The crystalline layer quality as determined by X-ray rocking curve measurement shows FWHM of 300-900 and 500-1300 arcsec for (002) and (102) planes, respectively.
DTIC
Aluminum Nitrides; Epitaxy; Halides; Substrates; Vapor Deposition; Vapors

20070005398 Brown Univ., Providence, RI USA
Template-Growth of Highly Ordered Carbon Nanotube Arrays on Silicon POSTPRINT
Yin, Aijun; Tzolov, Marian; Cardimona, David; Xu, Jimmy; Sep 2006; 5 pp.; In English
Report No.(s): AD-A460085; No Copyright; Avail.: CASI: A01, Hardcopy

This paper reports on the success in and the key conditions for direct growth or carbon nanotubes or unprecedented uniformity on silicon. The uniformity is ensured through the growth within the highly ordered nanopores or an alumina oxide template, which is in turn formed on silicon through anodization of aluminum of unprecedented thickness evaporated on silicon. The formation of highly ordered nanopore array by anodization of thick aluminum evaporated on a noncompliant substrate such as silicon is made possible through a specially designed process for evaporating thick aluminum of high quality and good adhesion.
DTIC
Adhesion; Aluminum Oxides; Carbon Nanotubes; Nanostructure Growth; Silicon; Templates

20070005408 Universal Technology Corp., Dayton, OH USA
Molybdenum Disulfide as a Lubricant And Catalyst in Adaptive Nanocomposite Coatings (Preprint)
Muratore, C; Voevodin, A A; Aug 2006; 19 pp.; In English
Contract(s)/Grant(s): F33615-03-D-5801; Proj-4349
Report No.(s): AD-A460098; No Copyright; Avail.: CASI: A03, Hardcopy

Nanocomposite YSZ-Ag-Mo-MoS2 with different MoS2 additions (0-100 atomic percent) coatings were deposited with a hybrid pulsed laser/magnetron sputtering/filtered cathodic arc process. Wear testing was performed from 25-700 degrees C for each of the coatings. Electron microscopy and other characterization techniques were used to examine the surfaces and wear tracks of the coatings to determine the mechanisms resulting in the measured tribological properties. Adaptive coatings containing 8 atomic percent MoS2 demonstrated a friction coefficient of 0.2 throughout the temperature range examined here, compared to 0.4 for YSZ-Ag-Mo with no MoS2. Characterization of the YSZ-Ag-Mo-8%MoS2 coating revealed that MoS2 and silver provided lubrication at temperatures less or equal 300 degrees C, while silver molybdate phases and MoO3 were lubricious at higher temperatures. Silver molybdate was not observed in the coatings containing 0% MoS2. The role of sulfur in the formation of silver molybdate is briefly discussed.
DTIC
Catalysts; Lubricants; Molybdenum Compounds; Molybdenum Disulfides; Nanocomposites; Tribology

20070005468 Air Force Research Lab., Wright-Patterson AFB, OH USA

Effect of O2 Partial Pressure on YBa2Cu3O7-delta Thin Film Growth by Pulsed Laser Deposition

Haugan, T J; Barnes, P N; Brunke, L; Maartense, I; Murphy, J; Apr 2004; 13 pp.; In English; Original contains color illustrations

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

Report No.(s): AD-A460193; AFRL-PR-WP-TP-2006-206; No Copyright; Avail.: CASI: A03, Hardcopy

YBa(2)Cu(3)O(7-delta) thin films were processed by pulsed laser deposition on (1 0 0) LaAlO(3) substrates using O(2) partial pressures from 120 to 1200 mTorr. The effect of O(2) pressure on film properties, including room temperature resistivities and microstructures, was studied for a unique set of deposition parameters. The film quality was observed to remain high over a wide range of O(2) partial pressures, with much less sensitivity to O(2) pressure than previous studies which are compared. For O(2) pressures from 200 to 1200 mTorr, superconducting transition temperatures consistently reached values \g91.5 K and transport critical current densities were 3-5 MA/sq cm (77 K, self-field). It is proposed that less sensitivity of film properties to O(2) pressure is achieved by: (1) reducing the particle velocity of the plume below a critical threshold, and (2) using a deposition temperature of 785 degrees C for adequate surface activation.

DTIC

Deposition; Oxygen Tension; Partial Pressure; Pressure Effects; Pulsed Laser Deposition; Pulsed Lasers; Thin Films; YBCO Superconductors

26
METALS AND METALLIC MATERIALS

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

20070003689 NASA Johnson Space Center, Houston, TX, USA

The Effects of Laser Peening and Shot Peening on Mechanical Properties in Friction Stir Welded 7075-T7351 Aluminum

Hatamleh, Omar; [2006]; 23 pp.; In English; Original contains color illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003689; Avail.: CASI: A03, Hardcopy

Peening techniques like laser peening and shot peening were used to modify the surface of friction stir welded 7075-T7351 Aluminum Alloy specimens. The tensile coupons were machined such as the loading was applied in a direction perpendicular to the weld direction. The peening effects on the global and local mechanical properties through the different regions of the weld were characterized and assessed. The surface hardness levels resulting from various peening techniques were also investigated for both sides of the welds. Shot peening resulted in an increase to surface hardness levels, but no improvement was noticed on the mechanical properties. In contrast, mechanical properties were improved by laser peening when compared to the unpeened material.

Author

Aluminum Alloys; Friction Stir Welding; Lasers; Mechanical Properties; Shot Peening

20070003787 Lawrence Livermore National Lab., Livermore, CA USA

Effect of Solution Annealing on Alloy 22 Weld Properties

El-Dasher, B. S.; Torres, S. G.; Nov. 10, 2005; 14 pp.; In English

Report No.(s): DE2006-887277; No Copyright; Avail.: National Technical Information Service (NTIS)

The effect of solution annealing temperature on the microstructure and observed corrosion attack mode in Alloy 22 welds was assessed. Specimens were examined in the as-welded state as well as solution annealed for 20 minutes at temperatures ranging from 1075C to 1300C. The microstructures of the specimens were first mapped using electron backscatter diffraction to determine the grain structure evolution due to solution annealing. Full recrystallization of the fusion zone was only observed in the 1200C and 1300oC specimens, although the 1300C specimen showed abnormal grain growth. As-welded, 1121C and 1200C specimens were also subjected to electrochemical testing in a 6 molal NaCl + 0.9 molal KNO3 environment to initiate crevice corrosion. Examination of the specimen surfaces after corrosion testing showed that in the as-welded specimen, corrosion was present in both the weld dendrites as well as around the secondary phases. However, the specimen solution annealed at 1121C showed corrosion only at secondary phases and the specimen annealed at 1200C showed pitting corrosion only in a handful of grains.

NTIS

Annealing; Corrosion; Temperature Effects; Alloys; Weld Tests

20070004573 Idaho Univ., Moscow, ID USA
Advanced Microwave Ferrite Research (AMFeR): Phase Two
Dec 31, 2006; 48 pp.; In English
Contract(s)/Grant(s): N00014-05-1-0239
Report No.(s): AD-A459628; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Ferrites; Microwaves

20070004716 Reed Intellectual Property Law Group, Menlo Park, CA, USA
Methods and Apparatuses for Producing Metallic Compositions via Reduction of Metal Halides
Sanjurjo, A.; Thiers, E.; Lau, K. H.; Hildenbrand, D. L.; Krishnan, G. N.; 6 Aug 04; 14 pp.; In English
Contract(s)/Grant(s): DARPA-MDA972-03-C-0032
Patent Info.: Filed Filed 6 Aug 04; US-Patent-Appl-SN-10-913 688
Report No.(s): PB2007-100880; No Copyright; Avail.: CASI: A03, Hardcopy

Methods and apparatuses for producing a solid metallic composition by reacting a gaseous metal halide with a reducing agent are described. The method generally includes reacting a gaseous metal halide with a reducing agent in a manner effective to form a nonsolid reaction product, wherein the metal halide has the formula MX(sub i) in which M is a metal selected from a transition metal of the periodic table, aluminum, silicon, boron, and combinations thereof, X is a halogen, i is greater than 0, and the reducing agent is a gaseous reducing agent selected from hydrogen and a compound that releases hydrogen, and combinations thereof; and solidifying the reaction product, thereby forming a metallic composition comprising M that is substantially free from halides. The invention may be used to produce high-purity metallic compositions, particularly titanium particles and alloys thereof for use in powder metallurgy applications.
NTIS

Metal Halides; Composition (Property); Transition Metals

20070004749 Universal Energy Systems, Inc., Dayton, OH USA
Development of Low Density CaMg-Al-Based Bulk Metallic Glasses (Preprint)
Oct 2006; 18 pp.; In English
Contract(s)/Grant(s): FA8650-04-D-5233; Proj-2311
Report No.(s): AD-A459780; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Metallic Glasses; Magnesium; Calcium; Low Density Materials

20070004754 Universal Energy Systems, Inc., Dayton, OH USA
Composition Range and Glass Forming Ability of Ternary Ca-Mg-Cu Bulk Metallic Glasses (Preprint)
Oct 2006; 20 pp.; In English
Contract(s)/Grant(s): FA8650-04-D-5233; Proj-2311
Report No.(s): AD-A459779; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Glass; Metallic Glasses; Carbon; Magnesium; Copper

20070004756 Universal Energy Systems, Inc., Dayton, OH USA
Precipitation in Al-Zn-Mg-Cu Alloys Modified With Sc and Zr During Aging (Preprint)
Dec 2006; 12 pp.; In English
Contract(s)/Grant(s): F04611-02-C-0014; Proj-2311
Report No.(s): AD-A459778; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Aluminum Alloys; Magnesium Alloys; Zinc Alloys; Precipitation

20070004758 Air Force Research Lab., Wright-Patterson AFB, OH USA
Effect of Strain-Path Reversal on Microstructure Evolution and Cavitation During Hot Torsion Testing of Ti-6A1-4V (Preprint)
Oct 2006; 35 pp.; In English
Contract(s)/Grant(s): Proj-4347
Report No.(s): AD-A459776; AFRL-ML-WP-TP-2006-506; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Cavitation Flow; Microstructure; Torsion; Titanium; Strain Energy Release Rate

20070004971 Pietragallo, Bosic and Gordon, Pittsburgh, PA, USA
Reactive Materials and Thermal Spray Methods of Making Same
Langan, T.; Buchta, W. M.; Riley, M. A.; 21 Jun 04; 15 pp.; In English
Contract(s)/Grant(s): ASMDC-DASG60-03-C-0025; AF-F08630-03-C-0022
Patent Info.: Filed Filed 21 Jun 04; US-Patent-Appl-SN-10-873 411
Report No.(s): PB2007-100902; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention relates to reactive materials formed by thermal spray techniques. The thermally sprayed reactive materials have low porosity and high structural integrity. The reactive materials are useful for applications such as shaped charges, thermite welding, near net shaped components and the like.
NTIS

Patent Applications; Reactivity; Sprayers; Thermal Analysis

20070005011 NASA Glenn Research Center, Cleveland, OH, USA
Development of GRCop-84 for Rocket Engine Applications
Ellis, David L.; Nathal, Michael V.; [2007]; 10 pp.; In English; The Compsites at Lake Louise Conference, 10 Oct. - 5 Nov. 2006, Alberta, Canada; Original contains color illustrations
Contract(s)/Grant(s): WBS 599489.02.07.03; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005011; Avail.: CASI: A02, Hardcopy

GRCop-84 (Cu-8 at.% Cr-4 at.% Nb) has been under development at the NASA Glenn Research Center for several years. The alloy possesses a unique combination of good thermal conductivity, high elevated temperature strength, long creep lives and long low cycle fatigue lives. The alloy is also more oxidation resistant than pure copper and most competitive alloys. The combination of properties has attracted attention from major rocket engine manufacturers who are interested in the alloy for the combustion chamber liner in their next generation of regeneratively cooled engines. It is also a strong candidate for various components in hypersonic vehicles, which also experience very high heat flux conditions. This presentation will discuss the alloy design strategies used to develop GRCop-84 and the various processing routes available for manufacturing components. The microstructure and mechanical properties of the alloy will be reviewed, as well as the results of actual hot fire testing of subscale rocket combustion chambers. The use of environmental and thermal barrier coatings to extend the performance to even higher levels will also be discussed.
Author

Thermal Conductivity; Rocket Engines; Creep Properties; Thrust Chambers; Mechanical Properties; Regenerative Cooling; Alloys; Copper; Thermal Control Coatings

20070005112 Lawrence Livermore National Lab., Livermore, CA USA
In-Situ Observation of Phase Transformations During Welding of 1045 Steel Using Spatially Resolved and Time Resolved X-Ray Diffraction
Elmer, J.; Palmer, T.; DebRoy, T.; Nov. 02, 2005; 16 pp.; In English
Report No.(s): DE2006-886670; No Copyright; Avail.: National Technical Information Service (NTIS)

Synchrotron-based methods have been developed at Lawrence Livermore National Laboratory (LLNL) for the direct observation of microstructure evolution during welding. These techniques, known as spatially resolved (SRXRD) and time resolved (TRXRD) x-ray diffraction, allow insitu experiments to be performed during welding and provide direct observations of high temperature phases that form under the intense thermal cycles that occur. This paper presents observations of microstructural evolution that occur during the welding of a medium carbon AISI 1045 steel, using SRXRD to map the phases that are present during welding, and TRXRD to dynamically observe transformations during rapid heating and cooling. SRXRD was further used to determine the influence of welding heat input on the size of the high temperature austenite region,

and the time required to completely homogenize this region during welding. These data can be used to determine the kinetics of phase transformations under the steep thermal gradients of welds, as well as benchmark and verify phase transformation models.
NTIS
Phase Transformations; Steels; Welding; X Ray Diffraction

20070005133 NASA Glenn Research Center, Cleveland, OH, USA
High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems
Locci, Ivan E.; Nesbitt, James A.; Ritzert, Frank J.; Bowman, Cheryl L.; [2007]; 8 pp.; In English; STAIF-2007, 11-15 Feb. 2007, Albuquerque, NM, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 997180.10.03.01; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005133; Avail.: CASI: A02, Hardcopy

Future generations of power systems for spacecraft and lunar surface systems will likely require a strong dependence on nuclear power. The design of a space nuclear power plant involves integrating together major subsystems with varying materia1 requirements. Refractory alloys are repeatedly considered for major structural components in space power reactor designs because refractory alloys retain their strength at higher temperatures than other classes of metals. The relatively higher mass and lower ductility of the refractory alloys make them less attractive for lower temperature subsystems in the power plant such as the power conversion system. The power conversion system would consist more likely of intermediate temperature Ni-based superalloys. One of many unanswered questions about the use of refractory alloys in a space power plant is how to transition from the use of the structural refractory alloy to more traditional structural alloys. Because deleterious phases can form when complex alloys are joined and operated at elevated temperatures, dissimilar material diffusion analyses of refractory alloys and superalloys are needed to inform designers about options of joint temperature and operational lifetime. Combinations of four superalloys and six refractory alloys were bonded and annealed at 1150 K and 1300 K to examine diffusional interactions in this study. Joints formed through hot pressing and hot isostatic pressing were compared. Results on newer alloys compared favorably to historical data. Diffusional stability is promising for some combinations of Mo-Re alloys and superalloys at 1150 K, but it appears that lower joint temperatures would be required for other refractory alloy couples.
Author
Refractory Metal Alloys; Thermal Stability; Annealing; Heat Resistant Alloys; Hot Isostatic Pressing; Nuclear Power Plants; Space Power Reactors; Diffusion; Fission; Metal Joints

20070005275 Army Research Development and Engineering Command, Warren, MI USA
Corrosion Preventing Characteristics of Military Hydraulic Fluids. Part 2
Jackman, Rachel; Tebbe, Jill M; Villahermosa, Luis A; Apr 16, 2007; 9 pp.; In English
Report No.(s): AD-A459883; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459883; Avail.: CASI: A02, Hardcopy

Hydraulic systems are widely used in a variety of military applications including ground vehicles, aircraft, and weapon systems. The impact of corrosion on hydraulic systems and its components is well understood; however, the protection provided by different hydraulic fluids is not equal. Review of military vehicle hydraulic systems has identified that the most common occurrences of critical corrosion are found in hoses, hose end fittings, actuator arms, pistons, cylinders, and rams. To prevent corrosion in hydraulic systems, the U.S. Army has specified the use of hydraulic fluids with corrosion preventing and rust inhibiting characteristics for ground vehicles.
DTIC
Corrosion; Corrosion Prevention; Hydraulic Equipment; Hydraulic Fluids

20070005304 Texas Univ. Health Science Center, San Antonio, TX USA
17Beta-Estradiol Modulates the Response of Human Osteoblasts to Titanium Surface Roughness
Tandy, Elizabeth M; Mar 2002; 31 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459934; CI04-1822; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459934; Avail.: Defense Technical Information Center (DTIC)

Estrogen (17beta-estradiol) is involved in the regulation of bone formation, and estrogen deficiency results in decreased bone density and bone mass, as well as a decrease in pull-out strengths of implants. In previous studies, implant surface roughness was shown to affect the morphology, proliferation and differentiation of MG63 osteoblast-like cells, by inducing a more mature phenotype and by increasing production of local factors. The purpose of the current study was to investigate

whether primary cultures of normal human female osteoblast (NHOst) cells respond in a similar fashion to these same surfaces and how these surfaces modulate cell response to 17beta-estradiol. Much of the Branemark literature supports the use of machined titanium surfaces for cases of suitable bone quality. Patients who present with less than ideal bone quality (i.e. osteoporotic bone) present a unique challenge to clinicians to enhance osseointegration that will allow masticatory function for many years to come. The possible effects of estrogen or estrogen deficiency on osseointegration are unclear. The in vitro model described here was designed to elucidate what effect, if any, did estrogen have on osteoblast response to titanium surface roughness, and conversely, what effect surface microtopography had on osteoblasts response to estrogen.
DTIC
Estrogens; Metal Surfaces; Osteoblasts; Surface Roughness; Titanium

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*.

20070004579 California Univ., Santa Barbara, CA USA
Study of Self-Assembly Monolayers for Colloidal Processing of Ceramics and Textured, Super-Hydrophobic
Aug 18, 2006; 9 pp.; In English
Contract(s)/Grant(s): DAAD19-02-1-0380
Report No.(s): AD-A459620; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available
Ceramics; Colloids; Hydrophobicity; Self Assembly

20070004686 Sandia National Labs., Albuquerque, NM USA
Ultra High Temperature Ceramics for Hypersonic Vehicle Applications
Loehman, R.; Corral, E.; Dumm, H. P.; Kotula, P.; Tandon, R.; Jun. 2006; 50 pp.; In English
Report No.(s): DE2006-887260; SAND2006-2925; No Copyright; Avail.: National Technical Information Service (NTIS)

HfB2 and ZrB2 are of interest for thermal protection materials because of favorable thermal stability, mechanical properties, and oxidation resistance. We have made dense diboride ceramics with 2 to 20 % SiC by hot pressing at 2000DGC and 5000 psi. High-resolution transmission electron microscopy (TEM) shows very thin grain boundary phases that suggest liquid phase sintering. Fracture toughness measurements give RT values of 4 to 6 MPam1/2. Four-pt flexure strengths measured in air up to 1450DGC were as high as 450 500 MPa. Thermal diffusivities were measured to 2000DGC for ZrB2 and HfB2 ceramics with SiC contents from 2 to 20%. Thermal conductivities were calculated from thermal diffusivities and measured heat capacities. Thermal diffusivities were modeled using different two-phase composite models. These materials exhibit excellent high temperature properties and are attractive for further development for thermal protection systems.
NTIS
Ceramics; Fracturing; High Temperature; Hypersonic Vehicles

20070004738 Argonne National Lab., IL, USA
Plutonium-238 Alpha-Decay Damage Study of the Ceramic Waste Form
Frank, S. M.; Barber, T. L.; Esh, D. G.; Giglio, J. J.; Goff, K. M.; January 2006; 82 pp.; In English
Report No.(s): DE2006-885495; ANL-NT-239; No Copyright; Avail.: National Technical Information Service (NTIS)

An accelerated alpha-decay damage study of a glass-bonded sodalite ceramic waste form has recently been completed. The purpose of this study was to investigate the physical and chemical durability of the waste form after significant exposure to alpha decay. This accelerated alpha-decay study was performed by doping the ceramic waste form with (sup 238)Pu which has a much greater specific activity than (sup 239)Pu that is normally present in the waste form. The alpha-decay dose at the end of the four year study was approximately 1 x 10(sup 18) alpha-decays/gram of material. An equivalent time period for a similar dose of (sup 239)Pu would require approximately 1100 years. After four years of exposure to (sup 238)Pu alpha decay, the investigation observed little change to the physical or chemical durability of the ceramic waste form (CWF). Specifically, the (sup 238)Pu-loaded CWF maintained it’s physical integrity, namely that the density remained constant and no cracking or phase de-bonding was observed. The materials chemical durability and phase stability also did not change significantly over the duration of the study. The only significant measured change was an increase of the unit-cell lattice parameters of the plutonium oxide and sodalite phases of the material and an increase in the release of salt components and plutonium of the waste form during leaching tests, but, as mentioned, these did not lead to any overall loss of waste form durability. The principal findings from this study are: (1) (sup 238)Pu-loaded CWF is similar in microstructure and phase composition to referenced waste form. (2) Pu was observed primarily as oxide comprised of aggregates of nano crystals with aggregates ranging in size from submicron to twenty microns in diameter. (3) Pu phases were primarily found in the intergranular glassy regions. (4) PuO phase shows expected unit cell volume expansion due to alpha decay damage of approximately 0.7%, and the sodalite phase unit cell volume has expanded slightly by 0.3% again, presumably due to alpha-decay damage. (5) No bulk sample swelling was observed. (6) No amorphization of sodalite or actinide bearing phases was observed after four years of alpha-decay damage. (7) No microcracks or phase de-bonding were observed in waste form samples aged for four years. (8) In some areas of the (sup 238)Pu doped ceramic waste form material bubbles and voids were found. Bubbles and voids with similar size and density were also found in ceramic waste form samples without actinide. These bubbles and voids are interpreted as pre-existing defects. However, some contribution to these bubbles and voids from helium gas can not be ruled out. (9) Chemical durability of (sup 238)Pu CWF has not changed significantly after four years of alpha-decay exposure except for an increase in the release of salt components and Pu. Still, the plutonium release from CWF is very low at less than 0.005 g/m(sup 2).

NTIS

Alpha Decay; Ceramics; Damage; Plutonium 238

20070004803 Research Inst. of National Defence, Umea, Sweden

Round Robin Testing Exercise on Method 8C of the STANAG 4360

Arnoldsson, K. C.; Claesson, O.; Jansson, A.; Oct. 2005; 24 pp.; In English

Report No.(s): PB2007-103377; FOI-R-1732-SE; No Copyright; Avail.: CASI: A03, Hardcopy

The resistance of paints to chemical agents is tested according to method BC of the SI ANAU 43bU. In OrGer10 validate the revised method a Round Robin testing exercise has been performed on panels provided by NATO. This report contains the Swedish results of absorbed and desorbed amounts of mustard, soman or VX. The Swedish results from paint system NATO in the present study is well in agreement with the results from the other participating nations. All nations measured an absorbed amount of HD above the limit. Two nations (Sweden and the Netherlands) measured a desorbed amount of HD above the limit. All nations measured absorbed and desorbed amounts below the limits for nerve gases. The report discusses method parameters such as number of extractions, extraction efficiency and recovery.

NTIS

Military Operations; Paints; Physical Exercise; Toxic Hazards

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20070004973 Iowa State Univ. of Science and Technology, Ames, IA USA

Ultra-Hard Low Friction Coating Based on ALMGB14 for Reduced Wear on MEMS and Other Tribiological Components and System

Cook, B. A.; Tian, Y.; Harringa, J. L.; Constant, A. P.; Russell, A. M.; 21 Sep 04; 10 pp.; In English

Contract(s)/Grant(s): DE-W-7405-ENG-82; NSF-DMI-0084969

Patent Info.: Filed Filed 21 Sep 04; US-Patent-Appl-SN-10-946 051

Report No.(s): PB2007-100901; No Copyright; Avail.: CASI: A02, Hardcopy

Performance and reliability of microelectromechanical system (MEMS) components enhanced dramatically through the incorporation of protective thin film coatings. Current-generation MEMS devices prepared by the LIGA technique employ transition metals such as Ni, Cu, Fe, or alloys thereof, and hence lack stability in oxidizing, corrosive, and/or high temperature environments. Fabrication of a superhard, self-lubricating coating based on a ternary boride compound AlMgB.sub.14 is described in this letter as a potential breakthrough in protective coating technology for LIGA microdevices. Nanoindentation tests show that hardness of AlMgB.sub.14 films prepared by pulsed laser deposition ranges from 45 GPa to 51 GPa, when deposited at room temperature and 573 K, respectively. Extremely low friction coefficients of 0.04-0.05, which are thought to result from a self-lubricating effect, have also been confirmed by nanoscratch tests on the AlMgB.sub.14 films. Transmission electron microscopy studies show that the as-deposited films are amorphous, regardless of substrate temperature; however, analysis of FTIR spectra suggests that the higher substrate temperature facilitates formation of the B.sub.12 icosahedral framework, therefore leading to the higher hardness.

NTIS

Borides; Coating; Friction; Microelectromechanical Systems; Patent Applications; Wear

20070004975 Sandia Corp., Albuquerque, NM, USA

Polymerization Welding and Application to Microfluidics

Simmons, B. A.; Crocker, R.; Dentinger, P. M.; Hunter, M. C.; Patel, K.; 12 Nov 03; 16 pp.; In English

Contract(s)/Grant(s): DE-AC04-94AL85000

Patent Info.: Filed Filed 12 Nov 03; US-Patent-Appl-SN-10-712 808

Report No.(s): PB2007-100900; No Copyright; Avail.: CASI: A03, Hardcopy

Methods and materials are described for the joining of plastics and other materials wherein polymerizable substances are diffused into the material to form a surface diffusion zone adjacent to the surface of the plastic workpiece to be joined. The surfaces are brought into contact and the polymerization reactions in the surface diffusion zone are initiated, creating thereby a strong bond across the contacting surfaces. High-performance engineered plastics such as polyetherimides, polyphenylenes, and polyether-ether-ketones are among the materials that are advantageously joined by this technique. Polymerizable substances including styrene and divinylbenzene are shown to give good bonds. Such joining methods can bond dissimilar materials difficult or impossible to join by other techniques. The surfaces to be joined are dry prior to initiation of the polymerization reaction, permitting repositioning and realignment of the surfaces as often as desired before joining. The present joining techniques do not clog or interfere with the structure of microfeatures on the surface of the workpieces to be joined, making this joining techniques especially advantageous for the fabrication of microfluidic devices. Such devices fabricated from high-performance engineered plastic joined by the present bonding techniques are shown to be capable of routine operation at high pressures and to withstand high-pressure cycling without damage.

NTIS

Microfluidic Devices; Patent Applications; Plastics; Polymerization; Welding

20070005054 Southwest Research Inst., San Antonio, TX USA, EPRI Ltd., Charlotte, NC, USA

Combustion Turbine (CT) Hot Section Coating Life Management. (Final Report)

Gandy, D.; Viswanathan, R.; Cheruvu, S.; Krzywosz, K.; Mar. 31, 2006; 101 pp.; In English

Report No.(s): DE2006-888937; No Copyright; Avail.: National Technical Information Service (NTIS)

The integrity of coatings used in hot section components of combustion turbines is crucial to the reliability of the buckets. This project was initiated in recognition of the need for predicting the life of coatings analytically, and non-destructively; correspondingly, four principal tasks were established. Task 1, with the objective of analytically developing stress, strain and temperature distributions in the bucket and thereby predicting thermal fatigue (TMF) damage for various operating conditions; Task 2 with the objective of developing eddy current techniques to measure both TMF damage and general degradation of coatings and, Task 3 with the objective of developing mechanism based algorithms. Task 4 is aimed at verifying analytical predictions from Task 1 and the NDE predictions from Task 3 against field observations.

NTIS

Coating; Combustion; Combustion Chambers; Protective Coatings; Turbines

20070005150 Sandia National Labs., Albuquerque, NM USA

Biological Restoration of Major Transportation Facilities Domestic Demonstration and Application Project (DDAP): Technology Develop(ment aat Sandia National Laboratories

Griffith, R. O.; Ramsey, J. L.; Finley, P. D.; Melton, B. J.; Brockmann, J. E.; Jun. 2006; 55 pp.; In English

Report No.(s): DE2006-889000; SAND2006-3560; No Copyright; Avail.: National Technical Information Service (NTIS)

The Bio-Restoration of Major Transportation Facilities Domestic Demonstration and Application Program (DDAP) is a designed to accelerate the restoration of transportation nodes following an attack with a biological warfare agent. This report documents the technology development work done at SNL for this DDAP, which include development of the BROOM tool, an investigation of surface sample collection efficiency, and a flow cytometry study of chlorine dioxide effects on Bacillus anthracis spore viability.

NTIS

Bacillus; Biological Weapons; Laboratories; Restoration; Transportation

20070005155 Sandia National Labs., Albuquerque, NM USA

Phase Transformation of ‘Chem-prep’ PZT 95/5-2Nb HF 1035 Ceramic Under Quasi-static Loading Conditions

Lee, M. Y.; Montgomery, S. T.; Hofer, J. H.; Meier, D. A.; Jul. 2006; 86 pp.; In English

Report No.(s): DE2006-888995; SAND2006-4387; No Copyright; Avail.: National Technical Information Service (NTIS)

Specimens of poled and unpoled chem-prep PNZT ceramic from batch HF1035 were tested under hydrostatic, uniaxial,

and constant stress difference loading conditions at 55, 25, and 75DGC. The objective of this experimental study was to characterize the mechanical properties and conditions for the ferroelectric (FE) to antiferroelectric (AFE) phase transformations of this chem-prep PNZT ceramic to aid grain-scale modeling efforts in developing and testing realistic response models for use in simulation codes. As seen from a previously characterized material (batch HF803), poled ceramic from HF1035 was seen to undergo anisotropic deformation during the transition from a FE to an AFE phase. Also, the phase transformation was found to be permanent for the two low temperature conditions, whereas the transformation can be completely reversed at the highest temperature. The rates of increase in the phase transformation pressures with temperature were practically identical for both unpoled and poled PNZT HF1035 specimens. We observed that temperature spread the phase transformation over mean stress analogous to the observed spread over mean stress due to shear stress. Additionally, for poled ceramic samples, the FE to AFE phase transformation was seen to occur when the normal compressive stress, acting perpendicular to a crystallographic plane about the polar axis, equals the hydrostatic pressure at which the transformation otherwise takes place.
NTIS
Ceramics; Ferroelectric Materials; Phase Transformations; Static Loads

20070005393 Universal Energy Systems, Inc., Dayton, OH USA
Computational Design of UHTC Materials for Hypersonic Applications (Preprint)
Parthasarathy, Triplicane A; Kerans, R J; Chellapilla, S; Roy, A; Jan 2006; 28 pp.; In English
Contract(s)/Grant(s): FA8650-04-D-5233; FA33615-01-C-5214; Proj-2302
Report No.(s): AD-A460079; No Copyright; Avail.: CASI: A03, Hardcopy

Ultra-High Temperature Ceramics (UHTC) are attractive candidates for use as leading edge components. This work explores the possibility of using computational methods to design a structure of higher strength and toughness within the constraint of 2D isotropy. The use of low-aspect ratio bone-shaped short fibers (BSSF) to improve fracture toughness and the use of composition tailoring to increase fiber strength were analyzed. Computational models show that significant improvements in fracture toughness can be realized with an aspect ratio of 15 if the fiber strengths can be raised to 1.5 GPa. The use of a single outer layer of lower thermal expansivity composition is predicted to increase strength by a factor of two, while multilayers of reasonable thickness result in strengthening by a factor of 3. It is predicted that these designs will offer significant leverage to increments from processing advances. An optimal design for a 2D fibrous monolith UHTC is suggested.
DTIC
Ceramics; High Temperature; Hypersonics

20070005422 KE Fibertec NA, Abingdon, MD USA
Textile Based Ventilation
Feb 26, 2004; 48 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460114; No Copyright; Avail.: CASI: A03, Hardcopy

Why use KE textile systems? * Uniform and correct air distribution (no dead zones) * Draft-free air distribution * No condensation problems, no insulation needed * Easy and inexpensive installation * Low weight * Specially developed alu-rail (Safetrack) * No growth of micro-organisms * Silent (soft material, no sharp edges).
DTIC
Air Flow; Flow Distribution; Textiles; Ventilation

20070005437 Air Force Research Lab., Wright-Patterson AFB, OH USA
Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint)
Haugan, T J; Evans, J M; Tolliver, J C; Maartense, I; Barnes, P N; Wong-Ng, W; Cook, L P; Shull, R D; Apr 2004; 8 pp.; In English
Contract(s)/Grant(s): Proj-3145
Report No.(s): AD-A460143; AFRL-PR-WP-TP-2006-204; No Copyright; Avail.: CASI: A02, Hardcopy

The effect of chemical composition substitutions on the flux pinning and physical properties of (Y,Nd) 1 + (XB(alpha2)-xCu3O7(-gamma)) superconductors was studied in powders processed by solid-state reaction and equilibrated in air at 910 deg C. The powders were subsequently processed in 1% O2 atmosphere at \h920 deg C to increased the superconducting transition temperature (T sub c) and critical current density (J sub c). After processing in air, the powders were nearly pure single-phase compositions as determined by X-ray diffraction. Powders were finally annealed in 100% O2

atmosphere at temperatures \h500 deg C to maximize T(sub c). The T(sub cs) of the powders were measured by ac susceptibility and dc magnetization methods. Annealing powders with a final step in 1% O2 atmosphere compared to processing in air significantly enhanced T(sub c) from 65-90 K to \g92 K for all compositions tested, and also increased from about 1000 - 100,000 A/sq cm to approximately 10(exp 6) A/sq cm. The flux pinning properties varied depending on exact composition, and the intrinsic behaviors changed with the final 1% O2 annealing treatment.
DTIC
Flux Pinning; Oxygen; Solid Solutions; Substitutes; Superconductors (Materials); YBCO Superconductors

20070005455 National Chiao Tung Univ., Hsinchu, Taiwan, Province of China
Spatial Position Control of CdS Nanoclusters using a Self-Assembled Diblock Copolymer Template
Yeh, Siao-Wei; Wu, Tsung-Lun; Wei, Kung-Hwa; Sep 21, 2004; 25 pp.; In English
Contract(s)/Grant(s): F62562-03-P-0398
Report No.(s): AD-A460173; No Copyright; Avail.: CASI: A03, Hardcopy

Core-shell structured quantum dots (QDs) such as CdSe/ZnS and Au/CdSe/ZnS nanoparticles are synthesized, and enhanced photoluminescent properties are observed in these nanoparticles as compared to that of bare core nanoparticles. For controlling the spatial position of nanoparticles with block copolymers, it was found that the mercapto-ethanol modified CdS nanoparticles have a preferential binding to the poly(ethylene oxide) block of polystyrene-b-poly(ethylene oxide) diblock copolymer, with a saturated concentration of 7% in volume fraction, and the composites have a better thermal stability. When CdS clusters have been sequestered into the PEO domain, the morphology of CdS/PS-b-PEO composite thin film was found to be transformed from cylinders to spheres by the presence of hydrogen bonds between surface-hydroxylated CdS and PEO. In another case Pyridine-modified CdSe nanoparticles were found to selectively disperse in the poly(4-vinylpyridine) block of polystyrene-b-poly(4-vinylpyridine) diblock copolymer, with their luminescence retaining as in the pure state. Moreover, the photoluminescence and electroluminescence of the dendritic copolyfluorene are dramatically enhanced when a few percentage of CdS nanoparticles was incorporated.
DTIC
Block Copolymers; Cadmium Sulfides; Copolymers; Templates

20070005498 Army Research Lab., Aberdeen Proving Ground, MD USA
The Effect of Hot Isostatic Pressing on the Optical Properties Of Spinel
Gilde, Gary; Patel, Parimal; Patterson, Philip; Blodgett, David; Duncan, Donald; Hahn, Daniel; May 20, 2004; 18 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460327; No Copyright; Avail.: CASI: A03, Hardcopy

The effect of different hot isostatic pressing (HIP) temperatures and pressures on the optical transmission of hot pressed spinel was studied. The transmittance and extinction coefficient were measured. The transmittance data was used to determine the relative size of the scattering sites. HIP temperatures as low as 1500 degree C were seen to be effective in increasing the transmittance. The transmittance increased with increasing HIP temperature and pressure. The size of the scattering sites were large relative to the wavelengths of light measured. Interestingly the size of the scattering site was found to increase with increasing HIP temperature and pressure.
DTIC
Hot Pressing; Optical Properties; Spinel

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*.

20070003554 NASA Stennis Space Center, Stennis Space Center, MS, USA
Modeling and Analysis of Facility Systems for A Hybrid Materials Test Program
Congiardo, Jared F.; [2007]; 1 pp.; In English
Report No.(s): SSTI-8080-0014; No Copyright; Avail.: Other Sources; Abstract Only

Analytic modeling and analysis processes employed at NASA-SSC in rocket propulsion systems testing are discussed in this paper with application to test facility propellant supply system design, activation and test of a hybrid rocket motor

provided. This paper discusses the analytic model employed, its utilization across project phases and reviews performance results.
Author
Mathematical Models; Systems Engineering; Test Facilities; Hybrid Propellant Rocket Engines

20070003602 Army Tank-Automotive Research and Development Command, Warren, MI USA
Elastomer Impact When Switch-Loading Synthetic Fuel Blends and Petroleum Fuels
Jul 2006; 38 pp.; In English
Report No.(s): AD-A459513; TARDEC-16028; No Copyright; Avail.: CASI: A03, Hardcopy
No abstract available
Crude Oil; Elastomers; Fuels; Mixtures; Switches; Synthetic Fuels

20070004822 Army Tank-Automotive Research and Development Command, Warren, MI USA
Near-Infrared Fuel Analysis
May 3, 2006; 22 pp.; In English
Report No.(s): AD-A459511; No Copyright; Avail.: CASI: A03, Hardcopy
No abstract available
Fuels; Near Infrared Radiation; Spectroscopy; Analyzing

20070004858 Jensen (Rolf) and Associates, Inc., Springfield, VA, USA
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Documentation of the Fuel System for Emergency Power in World Trade Center 7. NIST NCSTAR 1-1J
Grill, R. A.; Johnson, D. A.; Sep. 2005; 84 pp.; In English
Report No.(s): PB2007-104578; No Copyright; Avail.: CASI: A05, Hardcopy

This report was prepared to support the analysis of building and fire codes and standards of the National Institute of Standards and Technology World Trade Center (WTC) Investigation. As part of the investigation of WTC 7, the fuel oil distribution system is being analyzed as a possible cause of fire initiation. The purpose of this report is to document the fuel oil distribution systems (including all fuel oil tanks, pumps, generators, routing of the piping, and system functions) and the associated fire protection features of the fuel oil system that existed in WTC 7 at the time of the collapse.
NTIS
Buildings; Damage; Emergencies; Fire Prevention; Fuel Systems

20070004887 ManTech Environmental Technology, Inc., Dayton, OH USA
Pharmacokinetic Modeling of JP-8 Jet Fuel Components: II. A Conceptual Framework
Dec 2003; 41 pp.; In English
Contract(s)/Grant(s): Proj-1710
Report No.(s): AD-A459472; No Copyright; Avail.: CASI: A03, Hardcopy
No abstract available
JP-8 Jet Fuel; Pharmacology

20070005377 Army Tank-Automotive and Armaments Command, Warren, MI USA
Biodegradability of JP-8 Fuel in the Aquatic Environment
Rhee, In-Sik; Sep 30, 2003; 13 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460052; TACOM-13955; No Copyright; Avail.: CASI: A03, Hardcopy

JP-8 is a versatile kerosene-based aviation turbine fuel and is interchanged under NATO Code Number F-34. The U.S. military and NATO Nations have used JP-8 fuel for several decades as the single fuel on the battlefield. Its composition is essentially identical to JET A-i, used by commercial airlines for worldwide operations, except for the presence of an additive package consisting of a very small amount of a fuel system icing inhibitor, corrosion inhibitor/lubricity improver, and static dissipator additive (SDA). Under the single fuel concept for the military air and land battlefield operations, the U.S. Army also uses JP-8 for all diesel and gas turbine powered ground vehicles and equipment. JP-8 is currently procured under MIL-DTL-831331 in U.S.A and the other nations procure it under NATO STANAG 3747 Guide Specifications2.
DTIC
Biodegradability; Fuels; JP-8 Jet Fuel

20070005486 Naval Postgraduate School, Monterey, CA USA
A Comparison of the Navy and the Air Force Budgeting and Execution Process for Aviation Fuel (AVFUEL)
Herring, Larry J; Mack, Daniel R; Shimp, Samual P; Dec 2006; 101 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460311; No Copyright; Avail.: CASI: A06, Hardcopy

This research project provides background and explores issues related to management of Aviation Fuel (AVFUEL), Cost Per Flying Hour (CPFH), and the overarching Flying Hour Programs (FHP) for the Navy and the Air Force. Due to the variables used in the CPFH formulation and the complexity of flying hour budget formulation and execution, each armed service uses somewhat differing procedures in managing the FHP. This research focuses primarily on aircraft flying hours, and specifically the management of Aviation Fuel (AVFUEL). This research provides an overview to explain how the CPFH is used as well as analysis of the tasks of monitoring and managing the FHP based on the continuous flow of execution information from operating units. Also provided is a detailed evaluation of the CPFH concept in practice and a description of the structure used for each service, comparing the two. The research project focuses on the importance of management and decisions made at the Air Type Commander (TYCOM) and Major Command (MAJCOM) levels. The project reviews the Air Force process of FHP management centralization, in part to see whether there are lessons from the Air Force approach that may be applicable to improving FHP formulation and execution in the Navy.
DTIC
Aircraft Fuels; Armed Forces (United States); Budgeting; Federal Budgets; Navy

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*.

20070005187 Army Tank-Automotive and Armaments Command, Warren, MI USA
A Ground Vehicle Simulation Design to Study Driver Display Concepts
Meldrum, AnnMarie; Paul, Victor J; Reid, Alexander; Zywiol, Jr, Harry J; Jun 2, 2003; 9 pp.; In English
Report No.(s): AD-A459578; 13866; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459578; Avail.: CASI: A02, Hardcopy

The Tank Automotive Research, Development and Engineering Center's (TARDEC) Motion Base Technologies (MBT) team develops and applies simulation capabilities for the evaluation of emerging vehicle technologies. Currently, the MBT team is configuring its Ride Motion Simulator (RMS) [1] to investigate vehicle-driving performance using two indirect vision display methods. The investigation will focus on a driving simulation comparing three, flat-panel displays with a Head Mounted Display (HMD). This study will involve several subjects who will drive a modeled Stryker vehicle across a rendering of Aberdeen Proving Ground's (APG) Churchville terrain. Subjects will drive across different segments of the course at various speeds with each display type. Measures of driving performance will be taken and compared for each display type.
DTIC
Display Devices; Simulation

20070005238 Aptima, Inc., Woburn, MA USA
STRATA: Observer-based Measurement Agent Research Support
Freeman, Jared; Diedrich, Frederick; Ayers, Jeanine; Nov 30, 2006; 49 pp.; In English
Contract(s)/Grant(s): N00014-06-M-0122
Report No.(s): AD-A459826; AP-R-1366; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459826; Avail.: CASI: A03, Hardcopy

When learning to perform a task it is critical to have opportunities to practice the required behaviors. However, to be maximally effective, it is also the case that such practice needs to be accompanied by meaningful feedback to guide learning. Moreover, when considering how best to measure performance for feedback, it is critical to realize that there are multiple classes of performance measurement that are each essential, and unique, in their own right, including systems-based and observer-based measures. In the work reported here, we address this issue by focusing on a system that enables the collection and the integration of systems-based and observer-based measures. By providing an ability to collect and represent these measures in a common format, we have enabled the use of a wide range of feedback for trainees in simulation-based environments. Not only can complex measures be taken, but observer-based feedback can be integrated quickly and

seamlessly, bypassing the traditional time associated with manual processing of observations.
DTIC
Education; Measurement; Real Time Operation; Simulation; Strata

20070005350 Army Tank-Automotive and Armaments Command, Warren, MI USA
Algorithm for the Iterative Design of Observer Field Tests
Bennett, John G; Aug 2, 2002; 8 pp.; In English
Report No.(s): AD-A460026; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460026; Avail.: Defense Technical Information Center (DTIC)

In a previous paper, the author described a technique for designing an observer test in an iterative manner. In field tests to compare the observability of combat vehicles, the test designer must select the optimum number of observation opportunities to balance collecting enough data to draw valid conclusions against the high cost of supporting vehicles and personnel at a test site. The test designer can select the number of observations, N, so that a given experimental difference in detectability will be statistically significant at a given confidence level. Alternatively, the test designer can select N so that the probability of rejecting a given underlying difference in detectability is less than a given amount. The test designer, however, generally lacks key parameters for the efficient design of the test. Namely, the designer lacks the detection probabilities of the vehicles at each range. The standard deviation of the difference in detection probability depends upon the detection probability itself. Therefore, the test designer must select the number of observations for each range based upon the conservative assumption that the probabilities are near 50%, the probability for the maximum standard deviation. In the previous paper, an iterative technique of test design was described. In this technique, the test designer modifies the test matrix as the test progresses. Early test results yield estimates of the probability of detection for each vehicle at each range. Based on these estimates, the test designer reallocates the number of observations among the ranges, improving the efficiency of the test. In this paper, the author presents an algorithm to implement this iterative technique.
DTIC
Algorithms; Combat; Design Analysis; Detection; Experiment Design; Field Tests

20070005432 Army Tank-Automotive and Armaments Command, Warren, MI USA
An Introduction to Heavy-Duty Diesel Engine Frictional Losses and Lubricant Properties Affecting Fuel Economy - Part 1
Comfort, Allen; Dec 20, 2004; 14 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460134; TACOM-13961; No Copyright; Avail.: CASI: A03, Hardcopy

This paper examines sources and contributions of friction in heavy-duty diesel engines. Current and past work done on the characterization of diesel engine friction will be reviewed. It is also a goal to analyze each component system from a basic mechanics viewpoint highlighting some of the key friction producing phenomena. Different regimes of lubricated friction will be illustrated using a generic Stribeck diagram, with a focus on loading and relative velocities. Part II of this study will review lubricant effects on individual engine component friction as well as present data generated using commercial and military qualified lubricants in various bench tests, fired engine screening tests, and a modified version of the SAE J1321 Fuel Consumption Test using Army equipment.
DTIC
Diesel Engines; Friction Factor; Lubricants

20070005466 Army Tank-Automotive and Armaments Command, Warren, MI USA
Techniques for Iterative Design of Observer Field Tests
Bennett, John G; Apr 2002; 8 pp.; In English
Report No.(s): AD-A460191; TACOM-16146; No Copyright; Avail.: CASI: A02, Hardcopy

In field tests to compare the observability of combat vehicles, the test designer must select the optimum number of observation opportunities in order to balance collecting enough data to draw valid conclusions against the high cost of supporting vehicles and personnel at a test site. The test designer, however, generally lacks key parameters for the efficient design of the test. Narnely, the designer lacks the detection probabilities of the vehicles at each range. The standard deviation of the difference in detection probability depends upon the detection probability itself Therefore, the test designer must select the number of observations for each range based upon the conservative assumption that the probabilities are near 50%, the

probability for the maximum standard deviation In this paper, an iterative technique of test design is explored in order to improve the efficiency of observability tests.
DTIC
Combat; Field Tests

20070005495 Naval Postgraduate School, Monterey, CA USA
The Development of a Business Case Analysis for the Acquisition of the Agile Rapid Global Combat Support System Used for the USA Marine Corps' Ground Equipment
Jupiter, David L; Reuter, Lisa J; Dec 2006; 57 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460324; No Copyright; Avail.: CASI: A04, Hardcopy

Agile Rapid Global Combat Support (ARGCS) system is a new Automatic Test System being developed through the Department of Defense's Advanced Concept Technology Demonstration program. This business case analyzes ARGCS benefits for the Marine Corps as an option to replace their current Automated Test Systems for ground equipment. The business case analyzes the Marine Corps' current systems, specifically the Marine Corps' Third Echelon Test Set, and quantifies the relevant differences between these systems and the Agile Rapid Global Combat Support System.
DTIC
Combat; Commerce; Ground Support Equipment; Maintenance; Support Systems; Test Equipment; United States

20070005517 Turing Associates, Inc., Ann Arbor, MI USA
Intelligent Mobility Laboratory
Witus, Gary; Sep 26, 2006; 13 pp.; In English
Contract(s)/Grant(s): DAAE07-01-C-L066
Report No.(s): AD-A460367; TURING-06-14; No Copyright; Avail.: CASI: A03, Hardcopy

This report documents activities to develop and equip a laboratory for robot mobility research and development. The laboratory includes mobile robots, testing systems, instrumentation, analysis tools, as well as test and analysis procedures. Robot mobility tests and analyses were conducted to confirm the facilities and procedures.
DTIC
Evaluation; Mobility; Robots; System Effectiveness; Systems Engineering; Unmanned Ground Vehicles

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*.

20070003518 Joint C4ISR Battle Center, Suffolk , VA USA
Risk Driven Outcome-Based Command and Control (C2) Assessment
McBeth, Michael S; Jan 2000; 24 pp.; In English; Original contains color illustrations
Report No.(s): AD-A458928; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA458928; Avail.: CASI: A03, Hardcopy

This paper outlines an analysis approach that combines risk assessment, systems dynamics modeling, end-to-end testing, and fine-grained linked simulations to surface deficiencies and identify enhancements for Joint Task Force (JTF) Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) architectures. Conventional wisdom calls for building architecture framework products and executable simulations to understand and assess architecture behavior and performance. Unfortunately, in many cases these framework products do not exist and creating products for an architecture as large as a JTF before deployment is not realistic. The Joint C4ISR Outcome Based Integrated Architecture Assessment (JCOBIAA) team is pursuing an outcome based approach that uses risk assessment and systems dynamics modeling to prioritize issues and reduce the scope of the integrated architecture to be analyzed. The concept of functional threads for task accomplishment is used as a mechanism for analysis. In addition, end-to-end testing is proposed as a technique to address problem areas like interface compatibility and message exchanges since configuring actual hardware and software components in a distributed test environment can be easier and more reliable than developing or employing digital simulations.
DTIC
Command and Control; Risk

20070003546 Naval Research Lab., Washington, DC USA
A Wide-Aperture HF Direction-Finder with Sleeve Antennas
Aug 20, 1958; 36 pp.; In English
Report No.(s): AD-A459666; NRL-MR-843; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Apertures; Radio Direction Finders; Antenna Design; Sleeves

20070003548 Naval Research Lab., Washington, DC USA
Navigation Systems
Oct 22, 1957; 40 pp.; In English
Report No.(s): AD-A459665; NRL-5005; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Navigation; Systems Engineering

20070003693 Massachusetts Inst. of Tech., Cambridge, MA USA
Synthesis, Analysis, and Processing of Fractal Signals
Oct 1991; 239 pp.; In English
Contract(s)/Grant(s): N00014-89-J-1489; AFOSR-91-0034
Report No.(s): AD-A459698; RLE-TR-566; No Copyright; Avail.: CASI: A11, Hardcopy

No abstract available

Fractals; Signal Processing

20070003708 California Univ., Santa Cruz, CA USA
Medium Access Control in Ad Hoc Networks With Omni-Directional and Directional Antennas
Jun 2004; 168 pp.; In English
Contract(s)/Grant(s): DAA19-01-C-0026; F49620-00-1-0330
Report No.(s): AD-A459453; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Access Control; Omnidirectional Antennas; Directional Antennas

20070003810 Mitre Corp., Bedford, MA USA
Intrusion Detection for Air Force Networks: Environment Forecast
Oct 1997; 23 pp.; In English
Contract(s)/Grant(s): F19628-C-00001
Report No.(s): AD-A459591; MTR-97B0000084R1; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Detection; Forecasting; Warning Systems

20070003811 Mitre Corp., Bedford, MA USA
Intrusion Detection for Air Force Networks: Operational, Performance, and Implementation Goals
Oct 1997; 35 pp.; In English
Contract(s)/Grant(s): F19628-94-C-0001
Report No.(s): AD-A459590; MTR-97B0000035; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Detection; Warning Systems

20070003843 Stanford Research Inst., Menlo Park, CA USA
Experiments in Speech Understanding System Control
Paxton, William H; Aug 1976; 24 pp.; In English
Contract(s)/Grant(s): DAAG29-76-C-0011
Report No.(s): AD-A458903; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA458903; Avail.: CASI: A03, Hardcopy

A series of experiments was performed concerning control strategies for a speech understanding System. The main

experiment tested the effects on performance of four major choices: focus attention by inhibition or use an unbiased best-first method, 'island-drive' or process left to right, use context checks in priority setting or do not, and map words all at once or map only as called for. Each combination of choices was tested with 60 simulated utterances of lengths varying from 0.8 to 2.3 seconds. The results include analysis of the effects and interactions of the design choices with respect to aspects of system performance such as overall sentence accuracy, processing time, and storage. Other experiments include tests of acoustic processing performance and a study of the effects of increased vocabulary and improved acoustic accuracy.
DTIC
Speech Recognition; Words (Language)

20070003848 Washington Univ., Seattle, WA USA
CARAVAN: Providing Location Privacy for VANET
Sampigethaya, Krishna; Huang, Leping; Li, Mingyan; Poovendran, Radha; Matsuura, Kanta; Sezaki, Kaoru; Jan 2005; 16 pp.; In English
Contract(s)/Grant(s): W911NF-05-1-0491
Report No.(s): AD-A459198; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459198; Avail.: CASI: A03, Hardcopy

In vehicular ad hoc networks (VANET), it is possible to locate and track a vehicle based on its transmissions, during communication with other vehicles or the road-side infrastructure. This type of tracking leads to threats on the location privacy of the vehicle's user. In this paper, we study the problem of providing location privacy in VANET by allowing vehicles to prevent tracking of their broadcast communications. We first, identify the unique characteristics of VANET that must be considered when designing suitable location privacy solutions. Based on these observations, we propose a location privacy scheme called CARAVAN, and evaluate the privacy enhancement achieved under some existing standard constraints of VANET applications, and in the presence of a global adversary.
DTIC
Position (Location); Surface Vehicles

20070003881 Massachusetts Inst. of Tech., Cambridge, MA USA
Low Complexity Signal Processing and Optimal Joint Detection for Over-Saturated Multiple Access Communications
Dec 29, 1995; 20 pp.; In English
Contract(s)/Grant(s): F19628-95-C-0002; F49620-95-1-0083
Report No.(s): AD-A459653; LIDS-P-2315; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Multiple Access; Signal Processing; Telecommunication

20070004548 Naval Research Lab., Washington, DC USA
System Considerations of a Wide-Open, Crystal-Video, Two-Channel Direction Finder
Jun 8, 1956; 28 pp.; In English
Report No.(s): AD-A459636; NRL-MR-605; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Crystals; Radio Direction Finders; Navigation Aids; Position Indicators

20070004802 Swedish Defence Research Establishment, Linkoeping, Sweden
Positionering av Radiosaendare i Svar Radionmiljoe (Radio DF in Difficult Environment)
Amsby, J.; Nystroem, K.; Rasmussen, P.; Vaelberg, S.; Sep. 2005; 36 pp.; In Swedish
Report No.(s): PB2007-103378; FOI-R-1752-SE; No Copyright; Avail.: CASI: A03, Hardcopy

This report discusses the possibilities of locating radio transmitters in hard radio environments, and suggest the use of a number of sensors that monitors the overall signal strength. This is compared to a calibrated database and from this the system gets the position. A test system for the method is also suggested.
NTIS
Deuterium Fluorides; Radio Transmitters

20070004825 Michigan Univ., Ann Arbor, MI USA
Antigone: Implementing Policy in Secure Group Communication
Jan 2000; 34 pp.; In English
Contract(s)/Grant(s): ATM-9873025; F30602-00-2-0508
Report No.(s): AD-A459517; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Policies; Communication; Semantics; Groups

20070004827 Michigan Univ., Ann Arbor, MI USA
Ismene: Provisioning and Policy Reconciliation in Secure Group Communication
Jan 2000; 22 pp.; In English
Contract(s)/Grant(s): ATM-9873025; F30602-00-2-0508
Report No.(s): AD-A459520; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Policies; Provisioning; Communication; Groups

20070004832 Massachusetts Inst. of Tech., Cambridge, MA USA
Signal Processing and Communication with Solitons
Jun 1996; 143 pp.; In English
Contract(s)/Grant(s): N00014-89-J-1489; N00014-93-1-0686
Report No.(s): AD-A459529; RLE-TR-599; No Copyright; Avail.: CASI: A07, Hardcopy

No abstract available

Signal Processing; Solitary Waves; Communication

20070004862 Massachusetts Inst. of Tech., Cambridge, MA USA
Spread Spectrum Modulation and Signal Masking Using Synchronized Chaotic Systems
Feb 1992; 43 pp.; In English
Contract(s)/Grant(s): AFOSR-91-0034-A; N00014-91-C-0125
Report No.(s): AD-A459567; RLE TR-570; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Modulation; Spread Spectrum Transmission; Chaos; Synchronism

20070004866 Massachusetts Inst. of Tech., Cambridge, MA USA
Dynamic Articulatory Model of Speech Production Using Computer Simulation
Sep 1966; 129 pp.; In English
Contract(s)/Grant(s): AF19(628)-5661; NONR-4102(01)
Report No.(s): AD-A459565; No Copyright; Avail.: CASI: A07, Hardcopy

No abstract available

Computerized Simulation; Dynamic Models; Articulation (Speech)

20070004872 Space and Naval Warfare Systems Center, San Diego, CA USA
Motivations to Resolve Communication Dilemmas in Database-Mediated Collaboration
Apr 2002; 31 pp.; In English
Contract(s)/Grant(s): SBR9602055; SBR9422537
Report No.(s): AD-A459562; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Data Bases; Motivation; Communication

20070004929 Massachusetts Inst. of Tech., Cambridge, MA USA
Distributed Decision and Communication Problems in Tactical USAF Command and Control
Jul 30, 1983; 10 pp.; In English
Contract(s)/Grant(s): AFOSR-80-0229
Report No.(s): AD-A459569; LIDS-IR-1310; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Command and Control; Communication; Decision Making; Defense Program; Problem Solving

20070004947 Honeywell International, Inc., Morristown, NJ, USA

Bias-Adjusted Giant Magnetoresistive (GMR) Devices for Magnetic Random Access Memory (MRAM) Applications

Katti, R. R.; 6 Nov 03; 14 pp.; In English

Contract(s)/Grant(s): DTRA-01-00-C-0002

Patent Info.: Filed Filed 6 Nov 03; US-Patent-Appl-SN-10-702 974

Report No.(s): PB2007-100888; No Copyright; Avail.: CASI: A03, Hardcopy

A bias-adjusted giant magnetoresistive (GMR) device includes a ferromagnetic reference layer, which has a magnetization that remains relatively fixed when a range of magnetic fields is applied, and a ferromagnetic switching layer, which has a magnetization that can be changed by applying a relatively small magnetic field. In MRAM applications, the switching layer stores data in the form of the particular orientation of its magnetization relative to the magnetization of the reference layer. At least one of the reference and switching layers is split into at least two ferromagnetic layers separated by one or more layers of a nonmagnetic conductor, such that the hysteresis curve of resistance versus applied magnetic field is substantially symmetric about zero applied magnetic field.

NTIS

Bias; Magnetic Storage; Magnetoresistivity; Patent Applications; Random Access Memory

20070004961 Sandia National Labs., Albuquerque, NM USA, Ohio State Univ., Columbus, OH, USA

Hardware-in-the-Loop Testing of Wireless Systems in Realistic Environments

Burkholder, R. J.; Gupta, I. J.; Schniter, P.; Mariano, R.; Jun. 2006; 16 pp.; In English

Report No.(s): DE2006-889418; SAND2006-3518; No Copyright; Avail.: Department of Energy Information Bridge

This document describes an approach for testing of wireless systems in realistic environments that include intentional as well as unintentional radio frequency interference. In the approach, signal generators along with radio channel simulators are used to carry out hardware-in-the-loop testing. The channel parameters are obtained independently via channel sounding measurements and/or EM simulations.

NTIS

Telecommunication; Hardware-in-the-Loop Simulation; Wireless Communication

20070005002 Honeywell International, Inc., Morristown, NJ, USA

Communications System Based on Real-Time Neurophysiological Characterization

Dorneich, M. C.; Whitlow, S. D.; Verver, P. M.; Carciofini, J. C.; Creaser, J.; 9 Jun 05; 13 pp.; In English

Contract(s)/Grant(s): DARPA-DAAD16-03-C-0054

Patent Info.: Filed Filed 9 Jun 05; US-Patent-Appl-SN-11-148-537

Report No.(s): PB2007-103902; No Copyright; Avail.: CASI: A03, Hardcopy

A communications system is provided that includes a communications scheduler adapted to receive messages from a plurality of message sources and sensors. The messages comprise human and generated messages. The sensors comprise situational, neurophysiological and physiological sensors. The cognitive state profile processing unit receives sensor data and produces a current cognitive state profile for the user. The communications scheduler includes a context manager that receives outputs from the plurality of sensors, monitors a current user's tasks, and retains information about the user's environment, a message characterization unit that characterizes the messages using the attributes of the message, outputs from the sensors, and the user's specific baseline profile data and a presentation unit that receives the characterized messages, the cognitive state profile, and context information and queues the characterized messages into a prioritized message list and presents the message list to the user via the display unit.

NTIS

Characterization; Neurophysiology; Patent Applications; Real Time Operation; Scheduling; Telecommunication

20070005004 Balck Lowe and Grahan, PLLC, Seattle, WA, USA

Metamaterial Scanning Lens Antenna Systems and Methods

Davis, M. R.; Greegor, R. B.; Li, K.; Nelson, J. A.; Parazzoli, C. G.; 5 Aug 04; 9 pp.; In English

Contract(s)/Grant(s): MDA 972-01-2-0016

Patent Info.: Filed Filed 5 Aug 04; US-Patent-Appl-SN-10-913-109

Report No.(s): PB2007-103893; No Copyright; Avail.: CASI: A02, Hardcopy

The present invention is directed to systems and methods for radiating radar signals, communication signals, or other similar signals. In one embodiment, a system includes a controller that generates a control signal and an antenna coupled to

the controller. The antenna includes a first component that generates at least one wave based on the generated control signal and a metamaterial lens positioned at some predefined focal length from the first component. The metamaterial lens directs the generated at least one wave.
NTIS
Antenna Design; Controllers; Lens Antennas; Lenses; Scanners

20070005148 Ohio State Univ., Columbus, OH, USA, Sandia National Labs., Albuquerque, NM USA
EM Threat Analysis for Wireless Systems
Burkholder, R. J.; Gupta, I. J.; Schniter, P.; Mariano, R. J.; Jun. 2006; 64 pp.; In English
Report No.(s): DE2006-889002; SAND2006-3517; No Copyright; Avail.: National Technical Information Service (NTIS)

Modern digital radio systems are complex and must be carefully designed, especially when expected to operate in harsh propagation environments. The ability to accurately predict the effects of propagation on wireless radio performance could lead to more efficient radio designs as well as the ability to perform vulnerability analyses before and after system deployment. In this report, the authors - experts in electromagnetic (EM) modeling and wireless communication theory - describe the construction of a simulation environment that is capable of quantifying the effects of wireless propagation on the performance of digital communication.
NTIS
Electromagnetic Interference; Radio Communication; Telecommunication; Vulnerability

20070005192 BBN Systems and Technologies Corp., Cambridge, MA USA
Adaptation to New Microphones Using Tied-Mixture Normalization
Anastasakos, Anastasios; Kubala, Francis; Makhoul, John; Schwartz, Richard; Jan 1994; 6 pp.; In English
Contract(s)/Grant(s): N00014-91-C-0115; N00014-92-C-0035
Report No.(s): AD-A459585; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459585; Avail.: CASI: A02, Hardcopy

In this paper, we present several approaches designed to increase the robustness of BYBLOS, the BBN continuous speech recognition system. We address the problem of increased degradation in performance when there is mismatch in the characteristics of the training and the test microphones. We introduce a new supervised adaptation algorithm that computes a transformation from the training microphone codebook to that of a new microphone, given some information about the new microphone. Results are reported for the development and evaluation test sets of the 1993 ARPA CSR Spoke 6 WSJ task, which consist of speech recorded with two alternate microphones, a stand-mount and a telephone microphone.
DTIC
Adaptation; Microphones; Speech Recognition

20070005263 North Carolina State Univ., Raleigh, NC USA
Performance Analysis of Adaptive Transmission Aided by Long Range Channel Prediction for Realistic Single- and Multi-Carrier Mobile Radio Channels
Yang, Tung-Sheng; Jan 2004; 134 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459867; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459867; Avail.: CASI: A07, Hardcopy

No abstract available
Adaptation; Frequency Division Multiplexing; Radio Frequencies; Reliability Analysis; Telecommunication; Wireless Communication

20070005293 Massachusetts Inst. of Tech., Cambridge, MA USA
Perceptual Evaluation of Video-Realistic Speech
Geiger, Gadi; Ezzat, Tony; Poggio, Tomaso; Feb 2003; 19 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-00-1-0907; N00014-02-1-0915
Report No.(s): AD-A459909; AI-M-2003-003; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459909; Avail.: CASI: A03, Hardcopy

With many visual speech animation techniques now available, there is a clear need for systematic perceptual evaluation schemes. We describe here our scheme and its application to a new video-realistic (potentially indistinguishable from real recorded video) visual-speech animation system, called Mary 101. Two types of experiments were performed: a)

distinguishing visually between real and synthetic image-sequences of the same utterances, (Turing tests) and b) gauging visual speech recognition by comparing lip-reading performance of the real and synthetic image-sequences of the same utterances (Intelligibility tests). Subjects that were presented randomly with either real or synthetic image-sequences could not tell the synthetic from the real sequences above chance level. The same subjects when asked to lip-read the utterances from the same image-sequences recognized speech from real image-sequences significantly better than from synthetic ones. However, performance for both, real and synthetic, were at levels suggested in the literature on lip-reading. We conclude from the two experiments that the animation of Mary 101 is adequate for providing a percept of a talking head. However, additional effort is required to improve the animation for lip-reading purposes like rehabilitation and language learning. In addition, these two tasks could be considered as explicit and implicit perceptual discrimination tasks. In the explicit task (a), each stimulus is classified directly as a synthetic or real image-sequence by detecting a possible difference between the synthetic and the real image-sequences. The implicit perceptual discrimination task (b) consists of a comparison between visual recognition of speech of real and synthetic image-sequences. Our results suggest that implicit perceptuai discrimination is a more sensitive method for discrimination between synthetic and real image-sequences than explicit perceptual discrimination.
DTIC
Speech Recognition; Visual Perception

20070005309 Brown Univ., Providence, RI USA
Extensions of Proportional-Fair Sharing Algorithms for Multi-Access Control of Mobile Communications: Constraints, Finite Queues and Bursty Data Processes
Kushner, Harold J; Jan 2004; 7 pp.; In English
Contract(s)/Grant(s): DAAD19-02-1-0425; NSF-ECS-0097447
Report No.(s): AD-A459948; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459948; Avail.: CASI: A02, Hardcopy

We are concerned with the scheduling decisions (allocation of transmitter time, bandwidth and power) for multi-access mobile communications for data communications when the channels are randomly time varying. Time is divided into small scheduling intervals, called slots, and information on the channel rates for the various users is available at the start of the slot, when the user selections are made. There is a conflict between selecting the user that can get the most immediate data through and helping users with poor average throughputs. The Proportional Fair Sharing method (PFS) deals with such conflicts. In [4], [6] the convergence and basic qualitative properties were analyzed via stochastic approximation methods. The paths of the (suitably interpolated) throughputs converge to the solution of an ODE, akin to a mean flow. The behavior of the ODE completely describes the behavior of PFS. It has a unique equilibrium point that is asymptotically stable and optimal for PFS in that it is the maximizer of a concave utility function. There is a large family of such algorithms, each member corresponding to a concave utility function. Most past work assumed an in infinite backlog of data. In many applications, the data arrival process for some users is bursty and data is queued until transmission, there might be minimal throughput constraints, or a balance between queue length (or delay) and throughput sought. The fact that some queues might be empty at times raises new issues. Natural modifications of PFS for these cases are shown to have the same properties.
DTIC
Algorithms; Multiple Access; Telecommunication

20070005354 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
MAFFS and Military Support to Civil Authority: A Case Study in Command and Control
Lindsey, Brian W; May 2004; 92 pp.; In English
Report No.(s): AD-A460033; AFIT/GMO/ENS/04E-11; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460033; Avail.: CASI: A05, Hardcopy

Unity of Effort in Military Support to Civil Authority operations is an area of critical concern especially to the fledgling USA Northern Command. The nature and importance of command relationships between active duty and reserve forces involved in domestic operations has been highlighted in recent planning and operations. Through the reconstruction of the Command and Control structure during the planning and execution phases of the Modular Airborne Fire Fighting System employment during the 2003 Southern California Wild Fire Fighting season, critical areas are identified and possible Command and Control structure alternatives are developed. These areas and structures are filtered through a group of subject matter experts. The results of the interviews provide key insights into the nature of the critical areas and on the relevance of the proposed Command and Control structures for the Modular Airborne Fire Fighting System (MAFFS) mission as well as

other Military Support for Civil Authority (MSCA) missions. While it is determined there is no single Command and Control construct for MSCA
DTIC
Command and Control; Fire Fighting

20070005402 Naval Postgraduate School, Monterey, CA USA
Cross-Layer Design and Optimization for Wireless Sensor Networks
Lee, Lim T; Mar 2006; 83 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460089; No Copyright; Avail.: CASI: A05, Hardcopy

Cross-layer design and optimization is a new technique which can be used to design and improve the performance in both wireless and wire line networks. The central idea of cross-layer design is to optimize the control and exchange of information over two or more layers to achieve significant performance improvements by exploiting the interactions between various protocol layers. In this thesis, a cross-layer design and optimization framework was proposed and the concept of using the optimization agent to provide the exchange and control of information between the protocol layers was also introduced. The approach for this thesis is to investigate the effects of the wireless channel and the performance of a small scale wireless sensor network (WSN) to develop insights that can be used in the design and development of the optimization agent in the proposed cross-layer framework. A tap delay line (TDL) model was developed and simulated in MATLAB to investigate the effects of the wireless channel impairments due to mobility and multipath fading. Performance measurements were also conducted to study the effects of interference and transmission range for a group of networked wireless sensors.
DTIC
Communication Networks; Design Optimization; Wireless Communication

20070005425 Defence Science and Technology Organisation, Edinburgh, Australia
Simulation Activities Using Gateway and Tactical Digital Information Links
Filippidis, Arthur; Blandford, Steve; Foster, Kate; Moran, Gary; Sep 2006; 33 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460117; DSTO-TR-1918; No Copyright; Avail.: CASI: A03, Hardcopy

Under the auspices of the Air Platform Connectivity Research Task Air 05/086, novel gateway, Tactical Digital Information Link (TADIL) and Network Centric Warfare simulation activities involving Australian Defence Force (ADF) platforms and Mission System Test-beds (MSTs) are currently in progress in the Air Operations Division. Several recent TADIL activities involve investigations using the Rosetta Data Link Gateway product from the ANZUS Alliance and Northrop Grumman's Dual Link Simulator with Extended Capability. An overview of Airborne Mission System's contribution to the Variable Messaging Format demonstration at the 2005 International Data Link Symposium is also presented.
DTIC
Data Systems; Digital Data; Digital Systems; Information; Simulation

20070005453 Mitre Corp., Bedford, MA USA
Dual Use of Commercial Avionics Data Links for the U.S. Air Force
Girard, Mary M; Brady, Richard F; Hill, Stephen W; Jan 1999; 6 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460170; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available
Avionics; Data Links; Digital Systems; Voice Communication

20070005472 Carnegie-Mellon Univ., Pittsburgh, PA USA
Preserving Privacy by De-identifying Facial Images
Newton, Elaine; Sweeney, Latanya; Malin, Bradley; Mar 2003; 26 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00024-98-D-8124
Report No.(s): AD-A460282; CMU-CS-03-119; No Copyright; Avail.: CASI: A03, Hardcopy

In the context of sharing video surveillance data, a significant threat to privacy is face recognition software, which can automatically identify known people, such as from a database of drivers license photos, and thereby track people regardless of suspicion. This paper introduces an algorithm to protect the privacy of individuals in video surveillance data by de-identifying faces such that many facial characteristics remain but the face cannot be reliably recognized. A trivial solution to de-identifying faces involves blacking out each face. This thwarts any possible face recognition, but because all facial

details are obscured, the result is of limited use. Many ad hoc attempts, such as covering eyes or randomly perturbing image pixels, fail to thwart face recognition because of the robustness of face recognition methods. This paper presents a new privacy-enabling algorithm, named k-Same, that scientifically limits the ability of face recognition software to reliably recognize faces while maintaining facial details in the images. The algorithm determines similarity between faces based on a distance metric and creates new faces by averaging image components, which may be the original image pixels (k-Same-Pixel) or eigenvectors (k-Same-Eigen). Results are presented on a standard collection of real face images with varying k.
DTIC
Identifying; Images; Privacy; Surveillance; Video Signals; Visual Perception

20070005505 BBN Systems and Technologies Corp., Cambridge, MA USA
Improving State-of-the-Art Continuous Speech Recognition System Using the N-Best Paradigm with Neural Networks
Austin, S; Zavaliagkost, G; Makhoul, J; Schwartz, R; Jan 1992; 6 pp.; In English
Report No.(s): AD-A460339; No Copyright; Avail.: CASI: A02, Hardcopy

In an effort to advance the state of the art in continuous speech recognition employing hidden Markov models (HMM), Segmental Neural Nets (SNN) were introduced recently to ameliorate the well- known limitations of HMMs, namely, the conditional-independence limitation and the relative difficulty with which HMMs can handle segmental features. We describe a hybrid SNN/I-IMM system that combines the speed and performance of our HMM system with the segmental modeling capabilities of SNNs. The integration of the two acoustic modeling techniques is achieved successfully via the N-best rescoring paradigm. The N-best lists are used not only for recognition, but also during training. This discriminative training using N-best is demonstrated to improve performance. When tested on the DARPA Resource Management speaker-independent corpus, the hybrid SNN/HMM system decreases the error by about 20% compared to the state-of-the-art HMM system.
DTIC
Neural Nets; Speech Recognition

20070005506 BBN Systems and Technologies Corp., Cambridge, MA USA
Continuous Speech Recognition Using Segmental Neural Nets
Austin, S; Makhoul, J; Schwartz, R; Zavaliagkos, G; Jan 1991; 5 pp.; In English
Report No.(s): AD-A460342; No Copyright; Avail.: CASI: A01, Hardcopy

We present the concept of a ‘Segmental Neural Net’ (SNN) for phonetic modeling in continuous speech recognition. The SNN takes as input all the frames of a phonetic segment and gives as output an estimate of the probability of each of the phonemes, given the input segment. By tak- ing into account all the frames of a phonetic seg- ment simultaneously, the SNN overcomes the well- known conditional-independence limitation of hid- den Markov models (HMM). However, the prob- lem of automatic segmentation with neural nets is a formidable computing task compared to HMMs. Therefore, to take advantage of the training and decoding speed of HMMs, we have developed a novel hybrid SNN/HMM system that combines the advantages of both types of approaches. In this hy- brid system, use is made of the N-best paradigm to generate likely phonetic segmentations, which are then scored by the SNN. The HMM and SNN scores are then combined to optimize performance. In this manner, the recognition accuracy is guaran- teed to be no worse than the HMM system alone.
DTIC
Neural Nets; Speech Recognition

33
ELECTRONICS AND ELECTRICAL ENGINEERING

Includes development, performance, and maintainability of electrical/electronic devices and components; related test equipment; and microelectronics and integrated circuitry. for related information see also *60 Computer Operations and Hardware*; and *76 Solid-State Physics*. For communications equipment and devices see *32 Communications and Radar*.

20070003499 Optical Sciences Corp., Huntsville, AL USA
Dynamic IR Scene Projector Based Upon the Digital Micromirror Device
Beasley, D B; Bender, Matt; Crosby, Jay; Messer, Tim; Saylor, Daniel A; Jan 2001; 8 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAAH01-00-C-R093
Report No.(s): AD-A459086; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459086; Avail.: CASI: A02, Hardcopy

Optical Sciences Corporation has developed a new dynamic infrared scene projector technology called the Micromirror Array Projector System (MAPS). The MAPS is based upon the Texas Instruments Digital Micromirror Device (DMD) which has been modified to project images which are suitable for testing sensor and seekers operating in the UV, visible, and IR wavebands. The projector may be used in several configurations which are optimized for specific applications. This paper provides an overview of the design and performance of the MAPS projection system, as well as example imagery from prototype projector systems.
DTIC
Images; Microelectromechanical Systems; Projectors

20070003533 Ljubljana Univ., Ljubljana, Slovenia
Electrotechnical Review, Volume 73, No.4
Zajc, Baldomir, Editor; Trost, Andrej, Editor; 2006; ISSN 0013-5852; 84 pp.; In English; See also 20070003534 - 20070003544; Original contains black and white illustrations; Copyright; Avail.: Other Sources

The topics discussed include: 1) Possibilities and Limitations of Electric Power Transmission Over Long Distances Part 2 - Long distance AC transmission; 2) Development of the system for determination of the Size-of-Source Effect; 3) Self-calibration on a three-sampler network analyzer with nonstandard connectors; 4) Modulation in Stator Flux Control of Induction Motor for Reduced Torque Ripple; 5) Development of multi service provisioning platform in synchronous digital hierarchy systems; 6) Some issues at sampled-data identification and conversion of the identified models into the continuous-time domain; 7) Power System Dynamic Security Assessment using digital simulation; 8) E-LOTOS-Based Compositional Service-Based Synthesis of Multi-Party Time-Sharing-Based Protocols; 9) Mesh Partitioning with Ant Colonies; 10) Is validity of the Convolution theorem questionable? and 11) Importance of cooling system optimization with regard to lifetime and reliability of power transformers
CASI
Electrical Engineering; Electric Power Transmission; Protocol (Computers)

20070003535 Ljubljana Univ., Ljubljana, Slovenia
Some Issues at Sampled-Data Identification and Conversion of the Identified Models into the Continuous-Time Domain
Blazic, Saso; Electrotechnical Review, Volume 73, No.4; 2006, pp. 195-200; In Slovene; See also 20070003533; Copyright; Avail.: Other Sources

The paper deals with identification of continuous plants where the continuous model is not identified directly. Rather, it is obtained by converting the identified discrete-time model into the continuous-time domain. Two problems are exposed. Firstly, if the discrete-time model possesses poles on negative real axis, the conversion into the continuous-time domain is not possible. Secondly, due to many factors the identified model can be of non-minimum phase even though that does not hold for the plant itself. The virtual nonminimum phase property of the model unnecessarily limits the accessible performance of the closed-loop system. Two solutions to overcome each of the two problems are proposed. To ensure that the discrete-time model does not possess poles on the negative real axis, an algorithm that projects discrete poles to the right-hand-side half-plane is added to the on-line identification. The other possibility to circumvent the unwanted poles is to simply cancel them with zeros. This is done after identification and is justified since these poles are not the result of the actual modes in the plant. For the non-minimum phase zeros, the problem is solved by mirroring the zeros over the circular line into the unit circle. This transformation can be performed in each step of the on-line identification or just once after identification. One experiment was performed that tests the two proposed algorithms for avoidance of poles on negative real axis (the results are shown in Fig. 2 and Table 1). The other experiment tested the two proposed algorithms for avoidance of zeros outside the unit circle (the results are shown in Fig. 3 and Table 2).
Author
Sampled Data Systems; Mathematical Models; Discretization (Mathematics); Algorithms; Time Domain Analysis

20070003536 Ljubljana Univ., Ljubljana, Slovenia
Development of the System for Determination of the Size-of-Source Effect
Pusnik, Igor; Grgic, Goran; Electrotechnical Review, Volume 73, No.4; 2006, pp. 173-178; In Slovene; See also 20070003533; Copyright; Avail.: Other Sources

In calibration of radiation thermometers one of the contributions to the total measurement uncertainty depends on the target size. The phenomenon is known as the size-of-source effect (SSE). It is a result of radiation with the origin outside the instrument nominal target area, as defined by the field of view. The result is a different measured temperature as the size of

the measured source is changed. Many radiation thermometers, especially commercial thermometers, which operate in the infrared spectrum, that is at lower temperatures (below 600 C), suffer from a bad SSE characteristic. Currently, there is no standard available in thermometry defining a method for determination of the SSE of the radiation thermometer. Generally two methods are used, the direct and the indirect method. The direct method is more appropriate at lower temperatures. The radiation thermometer is focused on the blackbody having a variable diameter of the aperture. The ratio between the signal at a given radius and the signal at the maximum radius is a measure for the SSE. For measuring the SSE with the direct method we developed a system based on a water-cooled holder of aluminium plates with different diameters of the apertures (Figs. 3, 4 and 6). The SSE characteristic for the radiation thermometer with a linearized signal was measured. Results of the used direct method without correction of the background radiation are presented in Fig. 7 and those with correction in Fig. 8. The background radiation was found negligible at target temperatures above 200 C. Whenever applicable, the SSE should be determined at the highest temperature of the thermometer measuring range. The SSE characteristic is usually determined for targets larger than the nominal target of the radiation thermometer. If the SSE characteristic is known, a correction to the radiation thermometer reading can be applied for targets equal or slightly larger than the nominal target size. When the SSE is unknown, the measured target size shall be at least twice as large as the nominal target size of a radiation thermometer.
Author

Thermometers; Systems Engineering; Calibrating; Black Body Radiation

20070003537 Nuklearni Inst. Jozef Stefan, Ljubljana, Macedonia

Mesh Partitioning with Ant Colonies

Korosec, Peter; Silc, Jurij; Robic, Borut; Electrotechnical Review, Volume 73, No.4; 2006, pp. 215-220; In Slovene; See also 20070003533; Copyright; Avail.: Other Sources

Many real-world engineering problems can be expressed in terms of partial differential equations and solved by using the finite-element method, which is usually parallelized, i.e. the mesh is divided among several processors. To achieve high parallel efficiency it is important that the mesh is partitioned in such a way that workloads are well balanced and interprocessor communication is minimized. In this paper we present an enhancement of a technique that uses a nature-inspired metaheuristic approach to achieve higher-quality partitions. We present two heuristic mesh-partitioning methods, both of which build on the multiple ant-colony algorithm in order to improve the quality of the mesh partitions. The first method augments the multiple ant-colony algorithm with a multilevel paradigm, whereas the second uses the multiple antcolony algorithm as a refinement to the initial partition obtained by vector quantization. The two methods are experimentally compared with the well-known mesh-partitioning programs, p-METIS and Chaco.
Author

Partitions (Mathematics); Grid Generation (Mathematics); Optimization; Algorithms

20070003538 Milan Vidmar Electric Power Research Inst., Ljubljana, Slovenia

Importance of Cooling System Optimization with Regard to Lifetime and Reliability of Power Transformers

Gradnik, Tim; Babuder, Maks; Koncan-Gradnik, Maja; Electrotechnical Review, Volume 73, No.4; 2006, pp. 232-240; In Slovene; See also 20070003533; Copyright; Avail.: Other Sources

The paper presents different risk aspects of transformer insulation breakdown caused by ageing of transformer insulation. Evaluation of recent artificial ageing of paper-in-oil transformer insulation results explains the effect of winding temperature on the achievement of the targeted transformer lifetime. These results and findings of two studies made at the Milan Vidmar Electric Power Research Institute (EIMV) 2004/2005 assessing the ageing and cooling system state of large power transformers provided the basis for highlighting the occurrence of unexpected early ageing of particular large transformers that had been installed in the Slovenian power grid around 1980. Issues of temperature measurement and cooling system control associated with oil-forced type of transformer cooling are discussed in detail. Oil-forced type cooling has been installed in majority of the 400 kV and 220 kV large power transformers operating in the Slovenian power grid. The paper also discusses the importance of cooling optimization in order to have transformer residual lifetime extended and its life-cycle cost minimized.
Author

Cooling Systems; Reliability; Transformers; Electrical Insulation; Optimization; Electric Power

20070003539 Ljubljana Univ., Ljubljana, Slovenia

Power System Dynamic Security Assessment using Digital Simulation

Kerin, Uros; Bizjak, Grega; Electrotechnical Review, Volume 73, No.4; 2006, pp. 201-206; In Slovene; See also 20070003533; Copyright; Avail.: Other Sources

Electrical energy plays an extremely important role in the world's constantly increasing growth in economy and industry. This is why, power systems have been growing and are nowadays most complicated man-made systems in the world. To meet the increasing demand and to assure secure operation, an intensive planning and development of power systems have to be made. All over the world, engineers are using various approaches and methods to predict the systems behavior in most common conditions. Nowadays, the most widely used methods and simulations are made with neural networks and other fast and reliable procedures. Their main advantage is the speed of the calculation process. However, to prepare the neurons for it, they have to be trained, which is a much time consuming and complicated procedure. In this paper, we propose a new approach, based on the NETOMAC program system. The software already uses fast calculation methods and does not require any special additions. We use the NETOMAC's abilities to develop the basics for the new algorithm providing us with the Dynamic Security Assessment of the network. For testing purposes we utilize the topology of the Hydro-Quebec's 735kV transmission level. During the simulation, the system is exposed to various contingencies. They are different for each system and are normally reduced to the most severe ones. The paper presents theoretical basics of stability, structure of the developed framework and obtained results.
Author
Digital Simulation; Electricity; Security

20070003540 Ljubljana Univ., Ljubljana, Slovenia
Modulation in Stator Flux Control of Induction Motor for Reduced Torque Ripple
Nedeljkovic, David; Nemec, Mitja; Ambrozic, Vanja; Electrotechnical Review, Volume 73, No.4; 2006, pp. 1830188; In Slovene; See also 20070003533; Copyright; Avail.: Other Sources

The paper introduces an improved for Immediate Flux Control (IFC) of VSI-fed induction motor drive. IFC with single a voltage vector modulation, which is based on direct current control (DCC), reduces the commutation frequency in comparison with SVM [1]-[3]. With this method, an appropriate active volt v (sub I) impressed only during a precalculated time interval t(sub on) (1-6) within the sampling interval delta t to minimize the predicted stator flux error eplsilon(sub lambda) (Fig. 1). In the same manner, the new modulation approach combines complementary ions (7-13) of two optimal active voltage vectors v(sub I) and v(sub II) within the sampling interval (Fig. 2). Both active vectors are selected according to the sector of stator voltage reference v(sub S)(sup *); (Fig. 3, Fig. 4, and Table 2). Simulation results for an induction motor (Table 3), being controlled by IFC and predictive torque control (PTC) [4], show improved stator flux accuracy (Fig. 5, Fig. 6), while the commutation frequency is slightly increased; nevertheless it is still lower than in SVM. Torque response (Fig. 7) of the proposed method is as fast as in DTC [5]-[12] with significantly reduced torque ripple (Fig. 8). On the other hand, this modulation method has an important drawback, since the dead-time insertion between non-subsequent active voltage vectors requires major modifications in established control of inverter.
Author
Induction Motors; Ripples; Stators; Torque; Modulation; Flux (Rate)

20070003541 Nuklearni Inst. Jozef Stefan, Ljubljana, Macedonia
E-LOTOS-Based Compositional Service-Based Synthesis of Multi-Party Time-Sharing-Based Protocols
Kapus-Kolar, Monika; Electrotechnical Review, Volume 73, No.4; 2006, pp. 207-214; In English; See also 20070003533; Copyright; Avail.: Other Sources

In an earlier paper, we proposed a LOTOS/T+-based method for compositional service-based construction of multi-party time-sharing-based protocols. In the present paper, we generalize the method to services with data, real-time constraints, iteration, exception handling, multi-process synchronization and process suspension/resumption, and adapt it to work with the standard specification language E-LOTOS enhanced with weak sequencing. We also report a minor error in the earlier method and propose a more flexible event-reporting scheme.
Author
Protocol (Computers); Time Sharing; Computer Programming; Distributed Processing

20070003543 Ljubljana Univ., Ljubljana, Slovenia
Is Validity of the Convolution Theorem Questionable?
Kosir, Andrej; Electrotechnical Review, Volume 73, No.4; 2006, pp. 227-231; In Slovene; See also 20070003533; Copyright; Avail.: Other Sources

According to the convolution theorem, everY linear system Can be modeled by its impulse response- 'This is one of the fundamental tools in the linear system analysis and synthesis. The paper [13 presents a counterexample to the classical convolution theorem and raises the question of its impact on the real-world systems analysis and design. For demonstration purposes only, a simple electric circuit analysis as an example of convolution theorem application in practice is presented. An engineering view on the matter presented in the paper is given. A construction of a simple counterexample to the classical form of the convolution theorem is described and confronted by the proof of the classical convolution theorem. Prior to the discussion, the classical formulation of convolution tlieorem together with definitions and the outline of its proof is introduced. It appears the central point of validity of the convolution theorem are the definition of the convolution operator * and the domain (family of functions) it is defined on. The conclusion is that the counterexample has no effect whatsoever on the realworld systems analysis and synthesis.

Author

Mathematical Models; Convolution Integrals; Linear Operators; Theorem Proving

20070003544 Ljubljana Univ., Ljubljana, Slovenia

Possibilities and Limitations of Electric Power Transmission Over Long Distances Part 2 - Long distance AC transmission

Mihalic, Rafael; Povh, Dusan; Electrotechnical Review, Volume 73, No.4; 2006, pp. 161-166; In Slovene; See also 20070003533; Copyright; Avail.: Other Sources

During the past decades, individual power systems have been developing and have later been interconnected with the neighboring systems to gain technical and economical advantages. Thus interconnected systems may become extremely large, covering whole continents. Main task of interconnections is power exchange between the systems. The tendency for the future, in the liberalized electricity market environment is to have power transmitted over very long distances. However, the size of thus needed interconnected systems may be limited by technical or economical factors. In the paper, some technical problems of long distance AC transmission are investigated and presented by using typical examples. Such transmission should be effected over high-voltage levels due to transmission angle limitations. o maintain the acceptable voltage profile, lines have to be compensated. The impact of series and parallel compensation on the voltage profile is investigated. Power losses, which represent one of the most important factors for the economy of power transmission, are evaluated. Attention is also paid to the impact of an additional local power transmission between subsystems on the total local power transmission losses.

Author

Alternating Current; Electric Power Transmission; Electrical Engineering; Distance

20070003566 NASA Langley Research Center, Hampton, VA, USA

Carbon Nanotube Based Light Sensor

Wincheski, russell A., Inventor; Smits, Jan M., Inventor; Jordan, Jeffrey D., Inventor; Watkins, Anthony Neal, Inventor; Ingram, JoAnne L., Inventor; October 31, 2006; 14 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 10 Sep. 2004; US-Patent-7,129,467; US-Patent-Appl-SN-943831; NASA-Case-LAR-16573-1; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003566; Avail.: CASI: A03, Hardcopy

A light sensor substrate comprises a base made from a semi-conductive material and topped with a layer of an electrically non-conductive material. A first electrode and a plurality of carbon nanotube (CNT)-based conductors are positioned on the layer of electrically non-conductive material with the CNT-based conductors being distributed in a spaced apart fashion about a periphery of the first electrode. Each CNT-based conductor is coupled on one end thereof to the first electrode and extends away from the first electrode to terminate at a second free end. A second or gate electrode is positioned on the non-conductive material layer and is spaced apart from the second free end of each CNT-based conductor. Coupled to the first and second electrode is a device for detecting electron transfer along the CNT-based conductors resulting from light impinging on the CNT-based conductors.

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

Carbon Nanotubes; Sensors; Substrates; Light (Visible Radiation)

20070003567 Ljubljana Univ., Ljubljana, Slovenia

Electrotechnical Review, Volume 73, No. 5

Zajc, Baldomir, Editor; Trost, andrej, Editor; 2006; ISSN 0013-5852; 83 pp.; In English; In Slovene; See also 20070003568 - 20070003578; Original contains black and white illustrations; Copyright; Avail.: Other Sources

The topics discussed include: 1) Possibilities and Limitations of Electric Power Transmission Over Long Distances; 2) Semantic Web Rule Languages; 3) Model-driven architecture and its impact on the software development process; 4) The Flores mixed integer linear programming model for the optimal response of hydro cascades in the electricity spot market; 5)

On-line fault detection and isolation using analytical redundancy; 6) Statistical Alignment Models in Machine Translation from Slovenian to English; 7) Statistical Comparisons of Classifiers in Machine Learning; 8) Analysis of Flicker Levels in the Slovenian Transmission Network; 9) Analysis of Industrial Power Networks; 10) Uncertainty of the Characteristic of the Size-of-Source Effect in Radiation Thermometers; and 11) Softswitch architecture remodelling for new generation IP Multimedia Subsystem environment
CASI
Electrical Engineering; Computer Programming; Mathematical Models

20070003568 Ljubljana Univ., Ljubljana, Slovenia
Softswitch Architecture Remodelling for New Generation IP Multimedia Subsystem Environment
Volk, Mojca; Krenker, Andrej; Bester, Janez; Kos, Andrej; Electrotechnical Review, Volume 73, No. 5; 2006, pp. 309-314; In English; See also 20070003567; Copyright; Avail.: Other Sources

Widespread adoption of the next generation concepts in telecommunications has substantially affected the overall system architecture as well as each network element in particular. The softswitch is a heterogeneous control, service and management element. It is composed of several different logical functionalities that are vital to system operation of any kind and whose migration strategy has not yet been clearly defined. We present a general strategy of softswitch remodelling to meet IMS requirements and characteristics that might be interesting for different softswitch providers with respective architectural options in fixed or wireless domains. In the proposed solution, the initial softswitch architecture is presented in an independent and generalized way. Additional feature enhancements provide virtual parallel protocol environments inside a softswitch, each enabling specific advantages common to its features. The SIP segment is separated and introduced as an independent subsystem. Further architectural modularity assures a level of independency between parallel protocol environments and future openness with regard to IMS requirements. As a result, the IMS softswitch encompasses basic SIP/IMS functionalities while some of the existent compounds take over different roles of element intervorking functions and partially functionalities of standalone IMS entities. The proposed solution is limited to basic functionalities and is of a smaller scale but is open and IMS-ready.
Author
Architecture (Computers); Multimedia; Protocol (Computers); Internets; Communication Networks

20070003569 Ljubljana Univ., Ljubljana, Slovenia
Statistical Comparisons of Classifiers in Machine Learning
Demsar, Janez; Electrotechnical Review, Volume 73, No. 5; 2006, pp. 279-284; In Slovene; See also 20070003567; Copyright; Avail.: Other Sources

Comparisons between classifiers are a crucial element in most studies that introduce new machine learning algorithms or modifications of the existing ones. Despite their importance, there is no consensus in the community regarding which test should be applied in a certain situation, and excellent machine learning papers quite often conclude with statistical tests that are conceptually or statistically inappropriate. The situation is especially bad in comparisons of multiple classifiers, where the tests designed for comparisons of two samples are often used on each pair of classifiers instead of using omnibus tests like ANOVA or at least applying the appropriate corrections for multiple hypotheses testing. We analyzed the tests which are or which should (in our opinion) be used in machine learning studies: the paired t-test, the Wilcoxon signed-ranks test and the sign test for comparison of two classifiers, and ANOVA and the Friedman test with appropriate post-hoc tests for comparisons of multiple classifiers [10]. We checked what the tests really measure and what assumptions they make about the data; specifically, the parametric tests require commensurability of the results accross different domains assume that the results of classifiers are distributed normally. Since both of these conditions for the use of parametric tests are most probably violated, we dissuade from using the parametric tests. On the other hand, the described non-parametric tests suffer from none of these deficiencies. The same conclusion in favour of non-parametric tests is reached in the experimental part of the paper where we compare the tests on a selection of standard machine learning algorithms using the data sets from the UCI machine learning repository [l]. The non-parametric tests seem to have more power and be more replicable than the parametric ones both in comparisons between two (Fig. 1) and between multiple classifiers (Fig. 3), with the only exception of the Dunnet test for post-hoc comparisons of one classifier against all others, which rejects a somewhat larger number of hypotheses than the corresponding nonparametric alternative. Altogether, we recommend the use of nonparametric tests for comparisons of classifiers, but warn that other criteria beyond the grasp of statistics should be considered and possibly even favoured over the pure improvements in predictive power of classifiers.
Author
Algorithms; Classifiers; Machine Learning; Statistical Tests; Artificial Intelligence

20070003570 Ljubljana Univ., Ljubljana, Slovenia

Possibilities and Limitations of Electric Power Transmission Over Long Distances

Povh, Dusan; Mihalic, Rafael; Electrotechnical Review, Volume 73, No. 5; 2006, pp. 241-247; In Slovene; See also 20070003567; Copyright; Avail.: Other Sources

During the past decades, individual power systems have been developing and have later been interconnected with the neighboring systems to gain technical and economical advantages. Thus interconnected systems may become extremely large, covering whole continents. Main task of interconnections is power exchange between the systems. The tendency for the future, in the liberalized electricity market environment is to have power transmitted over very long distances. However, the size of thus needed interconnected systems may be limited by technical or economical factors. In the paper, some technical problems of long distance AC transmission are investigated and presented by using typical examples. Such transmission should be effected over high-voltage levels due to transmission angle limitations. o maintain the acceptable voltage profile, lines have to be compensated. The impact of series and parallel compensation on the voltage profile is investigated. Power losses, which represent one of the most important factors for the economy of power transmission, are evaluated. Attention is also paid to the impact of an additional local power transmission between subsystems on the total local power transmission losses.

Author

Distance; Electric Power Transmission; Electrical Engineering; Alternating Current

20070003571 Ljubljana Univ., Ljubljana, Slovenia

Analysis of Industrial Power Networks

Kerin, Uros; Bizjak, Grega; Zunko, Peter; Electrotechnical Review, Volume 73, No. 5; 2006, pp. 297-302; In Slovene; See also 20070003567; Copyright; Avail.: Other Sources

In this paper we propose guidelines for analyzing industrial power networks. We present basic structural differences that distinguish industrial power networks from other distribution networks, shortly describe the possible operating states and classify them with regard to various operating conditions. For testing purposes we built a model of a typical industrial power network. Its topology consists of different types of loads, and in particular asynchronous motors and a number of generators, able to assure partial autonomy of the network during critical operating states. In the simulation process, the model is put under stress of various contingencies causing dynamic changes in the load flow, voltage and frequency oscillations or even partial network islanding. To determine some particular characteristics of the network, the network response is monitored and afterwards analyzed. Simulation processes are made by using the Netomac power system, which is a powerful software tool designed for simulation and analysis of electrical power systems. With our model, the following operating states or contingencies are simulated: steady states, one-and-three phase short circuits, three-phase short circuits in utility's network followed by islanding of the part of the investigated network and starting-up of two 6 kV motors. In each case the network response is individually analyzed and presented either by numerical or graphical results.

Author

Industries; Topology; Mathematical Models; Electric Power; Electric Networks

20070003572 Maribor Univ., Maribor, Slovenia

On-Line Fault Detection and Isolation Using Analytical Redundancy

Valh, Drago; Bratina, Bozidar; Tovornik, Boris; Electrotechnical Review, Volume 73, No. 5; 2006, pp. 267-272; In English; See also 20070003567; Copyright; Avail.: Other Sources

In this paper fault detection and isolation schemes using an extended Luenberger observer for non-linear systems and linear fault sensitive filters are presented. The idea is to implement both approaches on the same plant, achieve on-line fault detection and show some practical issues related to on-line fault detection implementation on a real laboratory plant, where for evaluation of residuals and fault isolation an adaptive threshold together with Boolean decision logic is used. FDI methods tested in this paper were performed on a most popular case study, namely the three-tank system, which has in our case an unusual structure as the inflow to the tanks is mounted at the bottom of the tanks and contributes to additional non-linear behaviour. Online data acquisition was realized by local controller using Ethernet communication and OPC interface, and FDI schemes were performed in the Matlab/Simulink environment. The implemented fault detection schemes proved themselves well even when small abrupt changes/faults were generated in the real process.

Author

Fault Detection; On-Line Systems; Redundancy; Hydraulic Equipment

20070003574 Milan Vidmar Electric Power Research Inst., Ljubljana, Slovenia

The Flores Mixed Integer Linear Programming Model for the Optimal Response of Hydro Cascades in the Electricity Spot Market

Bregar, Zvonko; Electrotechnical Review, Volume 73, No. 5; 2006, pp. 161-166; In Slovene; See also 20070003567; Copyright; Avail.: Other Sources

Mixed integer linear programming (MILP) models have in the last decade gained considerable interest in simulation of deregulated electricity markets. They are based on an in-depth knowledge of all relavant technical characteristics (for example a cascade of hydro power plants), of the current state (for example the regulating basins states), and the forecast of external parameters (for example the 24 hours inflows forecast) of the system under study, and the hour-by-hour forecast of the electricity marginal price for the following day. Similar as in the linear programming (LP) models, in MILPs, too, all technical operation limitations are expressed as a set of linear equations and inequations. The optimization function in MILPs remains linear and is usually expressed as the maximum of the expected revenue from the electricity market. It is very important to note that some variables in MILPs can be of the integer type which allows far better modelling of system technical characteristics then in LPs. When applying MILPs, one does not ussually do the math since it suffices to use the available computer solvers. This paper presents the theory of the new MILP Flores model that has been developed at the Milan Vidmar Electric Power Research Institute. It is based on the Institute s PRAK model that calculates the hydro cascades production. The know-how follows the general LP energy flow MESSAGE model of the International Atomic Energy Agency. Two examples are added: the cascade of three existing runof-river plants on the Soca river including the new pumping hydro plant Avce and the weekly-cycle cascade of the two rehabilitated plants Moste II+III on the upper Sava river.

Author

Linear Programming; Hydroelectric Power Stations; Hydroelectricity; Electric Power Transmission

20070003575 Ljubljana Univ., Ljubljana, Slovenia

Model-driven Architecture and Its Impact on the Software Development Process

Vavpotic, Damjan; Krisper, Marjan; Electrotechnical Review, Volume 73, No. 5; 2006, pp. 255-260; In Slovene; See also 20070003567; Copyright; Avail.: Other Sources

The idea of model-driven software development is not new. It has been practiced in certain development fields for several years (e.g. data modeling). The trials to spread the idea to other fields of software development have been quite unsuccessful and never widely used in practice (e.g. CASE). Based on the gained experience, the architecture for model-driven development of software systems, Le. model-driven architecture (MDA), has been developed under the umbrella of the Object management group (OMG). MDA offers a theoretical basis that enables the development of software on a higher abstraction level. Its use also affects the software development process; on one hand, analysis and design become the most important parts of the development and on the other, implementation and testing turn to be less important. The first section of the paper briefly presents the basic concepts of MDA. The second section describes the impact of model-driven development and MDA on a software development process and especially focuses on a comparison between model driven development and agile processes.

Author

Mathematical Models; Software Development Tools; Architecture (Computers)

20070003576 Ljubljana Univ., Ljubljana, Slovenia

Analysis of Flicker Levels in the Slovenian Transmission Network

Blazic, Bostjan; Kobav, Matej B.; Pfajfar, Tomaz; Kerin, Uros; Matvos, Dejan; Skok, Kostja; Papic, Igor; Electrotechnical Review, Volume 73, No. 5; 2006, pp. 291-296; In Slovene; See also 20070003567; Copyright; Avail.: Other Sources

With deregulation of the Slovenian electricity market power quality has become an important issue for the transmission system operator (TSO), since poor power quality is no longer tolerated by electricity consumers. One of the greatest disturbances affecting power quality in the Slovenian transmission network is voltage flicker. It is mostly caused by arc furnaces producing voltage amplitude fluctuations resulting from strongly fluctuating power consumption. Voltage variations at frequencies between 0.5 and 25 Hz are of a special concern. They give rise to flicker, reflecting itself in changes in luminosity of lamps. As these disturbances may travel over a large area of the transmission network, they affect a considerable number of unsatisfied and consequently complaining consumers connected to distribution networks. A common equivalent circuit of arc furnace connection to the high-voltage (HV) network is shown in Fig. 1. The flicker level at the point of arc furnace connection to the transmission network is determined by the arc furnace operation and network impedances (Eq. 1). In large and complex networks, spreading of flicker distortion is influenced by many factors making analytical formulation difficult. Such networks can be analysed by means of simulation where special attention is paid to correct representation of

network topology, generators and flicker sources. Various power quality [1] measurements have already been made in the Slovenian HV transmission network (measurement points are listed in Table 1) in parallel with some permanent measurements made by the Slovenian TSO (ELES) [2]-[7]. The measurement results confirm that the main sources of flicker are large arc-furnaces in iron works Ravne, Store and Jesenice. The measurement results for the selected points are presented in Table 2 and geographical areas with flicker with the value above 1 are shown in Fig. 2. Simulation models of the Slovenian transmission network were implemented in SINCAL and PSCAD. Besides the basic network elements (generators, transformers, transmission lines and linear loads), an arc furnace model [8]-[ll] and IEC-based flicker-meter model [12], [13] were also developed. The arc-furnace model operation is described with equations (2)-(5). The complete network model and the arc furnaces models were calibrated to reflect as much as possible of the real network conditions and measurement results. With simulations in SINCAL, the flicker levels for the whole HV network were determined. On the other hand, the PSCAD model provides the basis for the analysis and evaluation of different flicker mitigation solutions. Flicker levels obtained with the two simulation tools are given in Table 2 allowing for a comparison with the measurement results. Table 3 shows the share of nodes in the HV network based on the flicker value. It is evident that flicker exceeds the value of 1 in 39% of all the nodes in 110 kV level
Author
Electricity; Flicker; Transmission Lines; Network Analysis; Mathematical Models

20070003578 Ljubljana Univ., Ljubljana, Slovenia
Uncertainty of the Characteristic of the Size-of-Source Effect in Radiation Thermometers
Pusnik, Igor; Grgie, Goran; Electrotechnical Review, Volume 73, No. 5; 2006, pp. 303-307; In Slovene; See also 20070003567; Copyright; Avail.: Other Sources

In calibration of radiation thermometers one of contributions to the total uncertainty of measurement depends on the target size. The phenomenon is known as the size-of-source effect (SSE). It is caused by radiation from an origin outside the instrument's nominal target area as defined by the field of view. As the size of the measured source varies, many radiation thermometers, especially the commercial thermometer, which operate in the infrared spectrum, that is at temperatures below 600 C, suffer from a bad SSE characteristic. The result are different measured temperatures. Generally two methods are available, the direct and the indirect method. The direct method is more appropriate at lower temperatures. In the direct method, a radiation thermometer is focused on the blackbody (radiation source), where the diameter of aperture is variable. The ratio between the signal at a given radius and the signal at the maximum radius is a measure for the SSE. We measured the SSE characteristic with the direct method for a radiation thermometer with a direct reading of temperature. Such radiation thermometers are most frequently used in practice. Correction for the SSE has to be evaluated in terms of its uncertainty. The paper presents evaluation of uncertainty in measuring the SSE with the direct method for a radiation thermometer with direct reading of temperature. A comparison is given between evaluation of uncertainty with consideration of the Planck's law and its approximation, which is the Wien's law. When the SSE is unknown, the measured target size shall be at least twice as large as the nominal target size of a radiation thermometer and even than.
Author
Calibrating; Thermometers; Instrument Errors; Temperature Measurement; Black Body Radiation; Size (Dimensions)

20070003697 Massachusetts Inst. of Tech., Cambridge, MA USA
Generating Efficient Layouts from Optimized MOS Circuit Schematics
Jan 1988; 204 pp.; In English
Contract(s)/Grant(s): AFOSR-86-0164; Proj-2305
Report No.(s): AD-A459613; RLE-TR-535; No Copyright; Avail.: CASI: A10, Hardcopy

No abstract available
Circuits; Layouts; Metal Oxide Semiconductors

20070003738 National Renewable Energy Lab., Golden, CO USA
Evaluation of Utility System Impacts and Benefits of Optimally Dispatched Plug-In Hybrid Electric Vehicles
Denholm, P.; Short, W.; Jul. 2006; 29 pp.; In English
Report No.(s): DE2006-888683; NREL/TP-620-40293; No Copyright; Avail.: Department of Energy Information Bridge

Hybrid electric vehicles with the capability of being recharged from the grid may provide a significant decrease in oil consumption. These 'plug-in' hybrids (PHEVs) will affect utility operations, adding additional electricity demand. Because many individual vehicles may be charged in the extended overnight period, and because the cost of wireless communication

has decreased, there is a unique opportunity for utilities to directly control the charging of these vehicles at the precise times when normal electricity demand is at a minimum. We evaluated the effects of optimal PHEV charging, under the assumption that utilities will indirectly or directly control when charging takes place, providing consumers with the absolute lowest cost of driving energy. By using low-cost off-peak electricity, PHEVs owners could purchase the drive energy equivalent to a gallon of gasoline for under 75 cents, assuming current national average residential electricity prices.
NTIS
Electric Motor Vehicles; Transportation; Utilities

20070003757 Massachusetts Inst. of Tech., Cambridge, MA USA
Physics and Fabrication of Quasi-One-Dimensional Conductors
Apr 1993; 136 pp.; In English
Contract(s)/Grant(s): DAAL03-92-C-0001; ECS-90-16437
Report No.(s): AD-A459599; RLE-TR-578; No Copyright; Avail.: CASI: A07, Hardcopy

No abstract available

Conductors; Fabrication

20070003780 National Renewable Energy Lab., Golden, CO USA
Device Performance
January 2006; 8 pp.; In English
Report No.(s): DE2006-887347; No Copyright; Avail.: National Technical Information Service (NTIS)

We measure the performance of PV cells and modules with respect to standard reporting conditions defined as a reference temperature (25 deg C), total irradiance (1000 Wm(sup -2)), and spectral irradiance distribution (IEC standard 60904-3). Typically, these are ‘global’ reference conditions, but we can measure with respect to any reference set. To determine device performance, we conduct two general categories of measurements: spectral responsivity (SR) and current versus voltage (I-V). We usually perform these measurements using standard procedures, but we develop new procedures when required by new technologies. We also serve as an independent facility for verifying device performance for the entire PV community. We help the PV community solve its special measurement problems, giving advice on solar simulation, instrumentation for I-V measurements, reference cells, measurement procedures, and anomalous results. And we collaborate with researchers to analyze devices and materials.
NTIS
Photovoltaic Conversion; Solar Cells

20070003820 Massachusetts Inst. of Tech., Cambridge, MA USA
A Noise Theory for the Magnetron. I. The Temperature Limited Low Current Densit Magnetron
Twiss, R Q; Nov 20, 1949; 44 pp.; In English
Contract(s)/Grant(s): DA36-039-SC-100
Report No.(s): AD-A459319; TR-116; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459319; Avail.: CASI: A03, Hardcopy

In Part I of this paper a noise theory is given for a temperature limited magnetron, valid for sufficiently low current densities, from which one can calculate the shot noise produced by such a tube in terms of the magnetron parameters and of the orbit of an individual electron. This theoretical noise output is compared with that actually produced by an experimental c-w magnetron type QK61 and two important differences are noted. The observed noise is as much as 30 db above the theoretical shot noise under certain conditions, while the observed rate of change of noise power with plate voltage is many times greater than that predicted for the theoretical shot noise. A general discussion of the possible origins of this excess noise is given and a theory to explain it is given in Part II of this paper, Technical Reports Nos. 117 and 118.
DTIC
Low Currents; Magnetrons

20070003847 Massachusetts Inst. of Tech., Cambridge, MA USA
The Throughput of Wavelength Routing Networks
Barry, Richard A; Humblet, Pierre A; Aug 1994; 3 pp.; In English
Contract(s)/Grant(s): MDA972-92-J-1038

Report No.(s): AD-A458814; LIDS-P-2263; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA458814; Avail.: CASI: A01, Hardcopy

We consider the problem of interconnecting N local area networks (LANs) through a wavelength routing all optical network (wavelength-routing AON) supporting F wavelengths at R b/s per wavelength. A wavelength-routing AON is one in which the path of a signal is a function only of the signal wavelength and the origin of the signal. We allow the possibility of wavelength changing so that a signal may arrive at a destination on a different wavelength than it originated on. Furthermore, we assume a slotted system, where each wavelength supports T periodic time slots. A session, i.e. connection between a transmitter and a receiver, is assumed to require one frequency-time slot of bandwidth, i.e. R/T b/s. Each LAN has one outgoing fiber, one incoming fiber, and an unspecified but large number of users. The outgoing (incoming) fiber of a LAN is connected by a broadcast star to all the transmitters (receivers) of that LAN. We assume that there is exactly one active session between each pair of LANs. Therefore the network supports N-squared sessions. Define the capacity, C, as the largest value of N-squared possible as a function of F and T.

DTIC

Local Area Networks; Wavelengths

20070003893 Oak Ridge National Lab., TN USA

Real Time Flux Control in PM Motors

Ottaduy, P. J.; McKeever, J. W.; Sep. 2005; 38 pp.; In English

Report No.(s): DE2006-885965; No Copyright; Avail.: National Technical Information Service (NTIS)

Significant research at the Oak Ridge National Laboratory (ORNL) Power Electronics and Electric Machinery Research Center (PEEMRC) is being conducted to develop ways to increase (1) torque, (2) speed range, and (3) efficiency of traction electric motors for hybrid electric vehicles (HEV) within existing current and voltage bounds. Current is limited by the inverter semiconductor devices' capability and voltage is limited by the stator wire insulation's ability to withstand the maximum back-electromotive force (emf), which occurs at the upper end of the speed range. One research track has been to explore ways to control the path and magnitude of magnetic flux while the motor is operating. The phrase, real time flux control (RTFC), refers to this mode of operation in which system parameters are changed while the motor is operating to improve its performance and speed range. RTFC has potential to meet an increased torque demand by introducing additional flux through the main air gap from an external source. It can augment the speed range by diverting flux away from the main air gap to reduce back-emf at high speeds. Conventional RTFC technology is known as vector control.

NTIS

Electric Generators; Real Time Operation; Electromotive Forces; Electric Motor Vehicles

20070004550 Naval Research Lab., Washington, DC USA

VLF Signal Reception Capability of Three Experimental Crossed-Loop Antennas

Sep 19, 1955; 44 pp.; In English

Report No.(s): AD-A459635; NRL-MR-522; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Very Low Frequencies; Loop Antennas; Signal Reception

20070004565 Massachusetts Inst. of Tech., Cambridge, MA USA

Challenges to Control in Signal Processing and Communications

Sep 1986; 15 pp.; In English

Contract(s)/Grant(s): AFOSR-82-0258

Report No.(s): AD-A459630; LIDS-P-1591; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Signal Processing; Telecommunication; Control

20070004670 Eidgenoessische Technische Hochschule, Lausanne, Switzerland

Development of High Efficiency, Low-Cost Flexible Dye-Sensitized Solar Cells

Aug 30, 2006; 49 pp.; In English

Contract(s)/Grant(s): FA8655-03-M-13068; Proj-4397

Report No.(s): AD-A459752; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Dyes; Solar Cells

20070004676 Oak Ridge National Lab., TN USA

Fractional-Slot Surface Mounted PM Motors with Concentrated Windings for HEV Traction Drives

Oct. 2005; 48 pp.; In English

Report No.(s): DE2006-885979; No Copyright; Avail.: National Technical Information Service (NTIS)

High-power density and efficiency resulting from elimination of rotor windings and reduced magnetic-flux losses have made the rare earth permanent magnet (PM) motor a leading candidate for the Department of Energy's Office of FreedomCAR and Vehicle Technologies (FCVTs) traction drive motor. These traction drives are generally powered by radial-gap motors, having the magnets on or embedded in a rotating cylinder separated from the inside surface of a slotted cylindrical stator by an annular gap. The two main types of radial-gap PM rotors are those with magnets mounted on the surface of a supporting back iron, called PM surface mounted (PMSM) motors, and those with magnets mounted in slots in the rotor, called interior PM (IPM) motors. Most early PM motor research was on the PMSM motor, which was thought to have an inherently low stator inductance. A low stator inductance can lead to currents dangerously exceeding rated current as the back-emf across the inductance increases with speed; consequently, part of the attempted solution has been to increase the stator inductance to reduce the rate of current rise. Although analysis suggested that there should be no problem designing sufficiently high stator inductance into PMSMs, attempts to do so were often not successful and a motor design was sought that would have a higher intrinsic inductance.

NTIS

Direct Current; Mechanical Drives; Permanent Magnets; Slots; Winding

20070004683 Oak Ridge National Lab., TN USA

Wide-Bandgap Semiconductors

Nov. 2005; 202 pp.; In English

Report No.(s): DE2006-886008; No Copyright; Avail.: National Technical Information Service (NTIS)

With the increase in demand for more efficient, higher-power, and higher-temperature operation of power converters, design engineers face the challenge of increasing the efficiency and power density of converters. Development in power semiconductors is vital for achieving the design goals set by the industry. Silicon (Si) power devices have reached their theoretical limits in terms of higher-temperature and higher-power operation by virtue of the physical properties of the material. To overcome these limitations, research has focused on wide-bandgap materials such as silicon carbide (SiC), gallium nitride (GaN), and diamond because of their superior material advantages such as large bandgap, high thermal conductivity, and high critical breakdown field strength. Diamond is the ultimate material for power devices because of its greater than tenfold improvement in electrical properties compared with silicon; however, it is more suited for higher-voltage (grid level) higher-power applications based on the intrinsic properties of the material. GaN and SiC power devices have similar performance improvements over Si power devices.

NTIS

Energy Gaps (Solid State); Semiconductors (Materials)

20070004685 Oak Ridge National Lab., TN USA

Interior Permanent Magnet Reluctance Machine with Brushless Field Excitation

Sep. 2005; 66 pp.; In English

Report No.(s): DE2006-886009; No Copyright; Avail.: National Technical Information Service (NTIS)

In a conventional permanent magnet (PM) machine, the air-gap flux produced by the PM is fixed. It is difficult to enhance the air-gap flux density due to limitations of the PM in a series-magnetic circuit. However, the air-gap flux density can be weakened by using power electronic field weakening to the limit of demagnetization of the PMs. This paper presents the test results of controlling the PM air-gap flux density through the use of a stationary brushless excitation coil in a reluctance interior permanent magnet with brushless field excitation (RIPM-BFE) motor. Through the use of this technology the air-gap flux density can be either enhanced or weakened. There is no concern with demagnetizing the PMs during field weakening. The leakage flux of the excitation coil through the PMs is blocked. The prototype motor built on this principle confirms the concept of flux enhancement and weakening through the use of excitation coils.

NTIS

Demagnetization; Excitation; Permanent Magnets; Reluctance

20070004688 Oak Ridge National Lab., TN USA

Floating Refrigerant Loop Based on R-134a Refrigerant Cooling of High-Heat Flux Electronics

Sep. 2005; 28 pp.; In English

Report No.(s): DE2006-886010; No Copyright; Avail.: National Technical Information Service (NTIS)

The Oak Ridge National Laboratory (ORNL) Power Electronics and Electric Machinery Research Center (PEEMRC) have been developing technologies to address the thermal issues associated with hybrid vehicles. Removal of the heat generated from electrical losses in traction motors and their associated power electronics is essential for the reliable operation of motors and power electronics. As part of a larger thermal control project, which includes shrinking inverter size and direct cooling of electronics, ORNL has developed U.S. Patent No. 6,772,603 B2, Methods and Apparatus for Thermal Management of Vehicle Systems and Components, and patent pending, Floating Loop System for Cooling Integrated Motors and Inverters Using Hot Liquid Refrigerant. The floating-loop system provides a large coefficient of performance (COP) for hybrid-drive component cooling. This loop (based on R-134a) is integrated with a vehicle's existing air-conditioning (AC) condenser, which dissipates waste heat to the ambient air.
NTIS
Air Conditioning; Alternating Current; Automobiles; Cooling; Floating; Heat Flux; Refrigerants

20070004745 Stanford Univ., Stanford, CA USA
Do Capacitively Coupled Electric Fields Accelerate Tibial Stress Fracture Healing
Dec 2005; 8 pp.; In English
Contract(s)/Grant(s): DAMD17-98-1-8519
Report No.(s): AD-A459781; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available
Electric Fields; Fracturing; Healing; Tibia

20070004750 National Inst. of Standards and Technology, Gaithersburg, MD, USA
Competing for the Future: Unlocking Small Wonders for Tomorrow's Nanoelectronic Uses
Oct. 2006; 46 pp.; In English
Report No.(s): PB2007-103596; No Copyright; Avail.: National Technical Information Service (NTIS)

It has been suggested that by 2025 at least half of the companies comprising today's Dow Jones Index will be replaced by nanotechnology companies. Nanoelectronics is defined as advanced electronic and optical systems that depend upon innovations in nanotechnology. The field of nanoelectronics embraces a range of technologies, all ultimately for the purpose of creating and improving the functionality, cost, and performance of tomorrow's electronic systems. This report examines the historical role the Advanced Technology Program (ATP) has played in fueling innovation and American competitiveness in areas of nanotechnology that will lead to totally new-to-the-world electronic and optical products.
NTIS
Histories; Nanotechnology

20070004752 Woods Hole Oceanographic Inst., MA, USA
Competing for the Future: A Historical Review of NIST ATP Investments in Semiconductor and Micro/Nano-Electronics
Jun. 2006; 41 pp.; In English
Report No.(s): PB2007-103595; No Copyright; Avail.: National Technical Information Service (NTIS)

The semiconductor and micro/nano-electronics industry plays a vital role in the continued growth of the US economy and national security. Since 1991, the Advanced Technology Program (ATP) of the National Institute of Standards and Technology (NIST), Technology Administration, U.S. Department of Commerce, has funded path-breaking new technologies of importance to this industry and the infrastructure upon which it depends. This report provides a historical review of ATP's investments in technologies of importance to this industry.
NTIS
Histories; Industries; Semiconductors (Materials); Technology Utilization

20070004757 Air Force Research Lab., Wright-Patterson AFB, OH USA
GHz Modulation of GaAs-Based Bipolar Cascade VCSELs (Preprint)
Nov 2006; 6 pp.; In English
Contract(s)/Grant(s): Proj-2002
Report No.(s): AD-A459777; AFRL-SN-WP-TP-2006-128; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available
Gallium Arsenides; Modulation; Bipolarity

20070004779 NASA Glenn Research Center, Cleveland, OH, USA

Series Connected Buck-Boost Regulator

Birchenough, Arthur G., Inventor; October 03, 2006; 12 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 25 Jul. 2005; US-Patent-7,116,568; US-Patent-Appl-SN-188962; US-Patent-Appl-SN-629875; NASA-Case-LEW-17353-2; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004779; Avail.: CASI: A03, Hardcopy

A Series Connected Buck-Boost Regulator (SCBBR) that switches only a fraction of the input power, resulting in relatively high efficiencies. The SCBBR has multiple operating modes including a buck, a boost, and a current limiting mode, so that an output voltage of the SCBBR ranges from below the source voltage to above the source voltage.

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

Regulators; Electric Connectors; Acceleration (Physics); Electrical Engineering

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20070004797 National Inst. of Standards and Technology, Gaithersburg, MD, USA

Competing for the Future: A Historical Review of NIST ATP Investments in Photonics and Optical Technologies

May 08, 2006; 7 pp.; In English

Report No.(s): PB2007-103591; No Copyright; Avail.: CASI: A02, Hardcopy

The photonics and optical technologies industry within the U.S. is largely built upon the innovations and ideas that have emerged from within academic and laboratory entities across the country, and then brought to the market - typically by small and medium sized companies that may be located within photonics regional clusters. Because of the complex nature of the innovation, expertise across multiple entities is often needed. These characteristics are reflected within ATP's (Advanced Technology Program) funding history. Between 1990 and 2004, approximately 72% of all ATP projects in photonics and optical technologies have involved small or medium sized U.S. companies. Over 36% of all ATP P&O awards have involved teaming among multiple joint venture participants. Thus, funding by ATP in photonics and optical technologies has been especially successful in aiding the competitive foundation of the U.S. photonics and optics industry, has benefited small and medium sized entrepreneurs, and has stimulated teaming between corporations and needed partners.

NTIS

Adenosine Triphosphate; Histories; Photonics

20070004799 National Inst. of Standards and Technology, Gaithersburg, MD, USA

Trends and Opportunities in Photonics Technologies: Solid-State Lighting and Healthcare

White, G. S.; Bertness, K. A.; Jun. 2006; 59 pp.; In English

Report No.(s): PB2007-103584; NISTIR-7305; No Copyright; Avail.: CASI: A04, Hardcopy

Photonics, the use of photons in optics, laser technology, electrical engineering, materials science, or information storage and processing, has migrated from being almost exclusively associated with research laboratories into mainstream industrial and consumer markets across the economy, including information technology, healthcare, security and safety, and lighting. In this document, we consider emerging photonic applications in the areas of solid-state lighting (frequently referred to as SSL) and medical applications. Our purpose is to provide a snapshot of the current state of photonics, as applied to SSL and healthcare, as well as to provide an estimate of future directions and anticipated achievements in these fields in the five to ten year time frame. At the same time, we will endeavor to highlight major technical barriers, as currently perceived, to reaching those goal. We base this document on a variety of sources of information. As detailed in Appendices I and II, we have interviewed NIST staff, both in the ATP and in the laboratories, representatives of other government agencies, and representatives from a variety of private companies. In addition, we have consulted reports and roadmaps generated by industrial consortia and government funding agencies. Because the issues in SSL and healthcare are quite different, the two topics will be considered in separate sections. However, the format for the sections will be the same: (1) a description of the current status, including a synopsis of both the technology and the current applications, (2) a discussion of where the technology and applications are expected to be moving in the 1 to 10 year time frame, and (3) the technical/scientific barriers that need to be overcome for anticipated progress to occur.

NTIS

Illuminating; Photonics; Solid State; Trends; Technology Utilization

20070004837 Georgia Inst. of Tech., Atlanta, GA USA
Development of a Non-Linear Element Code for the Improvement of Piezoelectric Actuator Design and Reliability
Jun 30, 2006; 20 pp.; In English
Contract(s)/Grant(s): DAAD19-02-1-0241
Report No.(s): AD-A459521; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Actuators; Nonlinearity; Piezoelectricity; Reliability

20070004846 Washington Univ., Seattle, WA USA
Broadcast with Heterogeneous Node Capability
Jan 2004; 7 pp.; In English
Contract(s)/Grant(s): N00014-04-1-0479; ANI-0093187
Report No.(s): AD-A459483; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Broadcasting; Heterogeneity; Nodes (Standing Waves)

20070004875 Air Force Research Lab., Edwards AFB, CA USA
The USAF Electric Propulsion Research Program (Postprint)
Jul 14, 2000; 12 pp.; In English
Report No.(s): AD-A459560; AFRL-PR-ED-TP-2000-152; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Electric Propulsion; Research Projects; Air Defense

20070004910 California Univ., Los Angeles, CA USA
A Quantum Dot Optical Modulator for Integration With Si CMOS
Aug 1, 2005; 6 pp.; In English
Contract(s)/Grant(s): W911NF-05-1-0422
Report No.(s): AD-A459498; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Quantum Dots; Modulators; CMOS

20070004949 Quarles and Brady LLP, Milwaukee, WI, USA
Simplified Hybrid Secondary Uncluttered Machine and Method
Hsu, J. S.; 12 Nov 03; 14 pp.; In English
Contract(s)/Grant(s): DE-AC05-000R22725
Patent Info.: Filed Filed 12 Nov 03; US-Patent-Appl-SN-10-706 331
Report No.(s): PB2007-100889; No Copyright; Avail.: CASI: A03, Hardcopy

An electric machine (40, 40 feet) has a stator (43) and a rotor (46) and a primary air gap (48) has secondary coils (47c, 47d) separated from the rotor (46) by a secondary air gap (49) so as to induce a slip current in the secondary coils (47c, 47d). The rotor (46, 76) has magnetic brushes (A, B, C, D) or wires (80) which couple flux in through the rotor (46) to the secondary coils (47c, 47d) without inducing a current in the rotor (46) and without coupling a stator rotational energy component to the secondary coils (47c, 47d). The machine can be operated as a motor or a generator in multi-phase or single-phase embodiments. A method of providing a slip energy controller is also disclosed.

NTIS

Electric Motors; Patent Applications

20070004959 Agilent Technologies, Inc., Leoveland, CO, Leoveland, CO, USA
Tunable Temporal Dispersion and Compensated Angular Dispersion in Optical Switching Systems
Stone, T. W.; 18 Nov 03; 14 pp.; In English
Contract(s)/Grant(s): AF-F 30602-98-C-0079
Patent Info.: Filed Filed 18 Nov 03; US-Patent-Appl-SN-10-717-414
Report No.(s): PB2007-100941; No Copyright; Avail.: CASI: A03, Hardcopy

Methods for utilizing optical systems in order to introduce digitally tunable amounts of temporal dispersion into optical

signals and methods and systems for providing angular dispersion compensated output from optical switching/routing systems. The method for introducing controlled amounts of temporal dispersion into a signal includes the steps of (a) selectively directing an electromagnetic radiation beam to a predetermined optical path, and (b) subsequently selectively directing the electromagnetic radiation beam to another predetermined optical path. The angular dispersion compensated optical system includes a switching/routing optical system and a beam deflection element optically disposed on an output side of the switching/routing optical system. During operation of the angular dispersion compensated optical system, the beam deflection element selectively deflects an output electromagnetic radiation beam originating from the switching/routing optical system in order to render, after selective deflection, a direction of propagation of the electromagnetic radiation output beam parallel to the direction of propagation of an input beam of the switching/routing optical system.
NTIS
Optical Switching; Patent Applications

20070004967 UT-Battelle, LLC., Philadelphia, PA, USA
Devices with Small-Scale Channels and the Fabrication Thereof by Etching
Ramsey, J. M.; Haynes, T. E.; Geldman, L. C.; Zehner, D. M.; 30 Jul 04; 27 pp.; In English
Contract(s)/Grant(s): DE-AC05-00OR22725
Patent Info.: Filed Filed 30 Jul 04; US-Patent-Appl-SN-10-903-310
Report No.(s): PB2007-100939; No Copyright; Avail.: CASI: A03, Hardcopy

A method of producing a novel small-scale flow channel in a mesoscale analytic device from a solid multi-layered heterostructure with one or more channel layers sandwiched between adjoining barrier layers. The channel layer consists of a thin-film of a material of different composition than the barrier layers. At least one of the layers has a defined small-scale thickness. A channel or recess is formed in the heterostructure by etching away the channel layer to a preselected depth. The amount of the channel layer which is etched away determines the depth of the channel, and the thickness of the channel layer determines the width. A method of producing a die for forming a small-scale channel is also disclosed.
NTIS
Etching; Fabrication; Microelectronics; Patent Applications

20070004981 Quarles and Brady LLP, Milwaukee, WI, USA
Integrated Inverter for Driving Multiple Electric Machines
Su, G. J.; Hu, J. S.; 12 Nov 03; 7 pp.; In English
Contract(s)/Grant(s): DE-AC05-00OR22725
Patent Info.: Filed Filed 12 Nov 03; US-Patent-Appl-SN-10-706 256
Report No.(s): PB2007-100894; No Copyright; Avail.: CASI: A02, Hardcopy

An electric machine drive (50) has a plurality of inverters (50a, 50b) for controlling respective electric machines (57, 62), which may include a three-phase main traction machine (57) and two-phase accessory machines (62) in a hybrid or electric vehicle. The drive (50) has a common control section (53, 54) for controlling the plurality of inverters (50a, 50b) with only one microelectronic processor (54) for controlling the plurality of inverters (50a, 50b), only one gate driver circuit (53) for controlling conduction of semiconductor switches in the plurality of inverters (50a, 50b), and also includes a common dc bus (70), a common dc bus filtering capacitor and a common dc bus voltage sensor (67). The electric machines (57, 62) may be synchronous machines, induction machines, or PM machines and may be operated in a motoring mode or a generating mode.
NTIS
Electric Motor Vehicles; Inverters; Patent Applications

20070005007 Schwegman, Lundberg, Woessner and Kluth, P.A., Minneapolis, MN, USA
Semiconductor Conductive Layers
Hill, P. O.; Dawson, L. R.; Dowd, P.; Krishna, S.; 15 Jun 05; 16 pp.; In English
Contract(s)/Grant(s): AFOSR-F496204-03-10437
Patent Info.: Filed Filed 15 Jun 05; US-Patent-Appl-SN-11-153-245
Report No.(s): PB2007-103889; No Copyright; Avail.: CASI: A03, Hardcopy

Structures and methods for electronic devices with improved conductive regions are provided. The conductive region may include digital alloy superlattice structures, which allow higher doping levels to be achieved than for a bulk (random) alloy with the same average composition. Furthermore, the superlattice structures may improve the resistivity of the region,

improving the current spreading of the region and hence the electronic properties of electronic devices such as optoelectronic devices.
NTIS
Patent Applications; Semiconductor Devices; Semiconductors (Materials)

20070005010 Du Pont de Nemours (E. I.) and Co., Wilmington, DE, USA
Electronic Device and Process for Forming Same
MacPherson, C. D.; Stainer, M.; Anzlowar, M.; Sant, P. A.; Venkatesh, S.; 3 Aug 04; 20 pp.; In English
Contract(s)/Grant(s): DARPA-4332
Patent Info.: Filed Filed 3 Aug 04; US-Patent-Appl-SN-10-910-496
Report No.(s): PB2007-103888; No Copyright; Avail.: CASI: A03, Hardcopy

An electronic device includes a substrate, a structure having openings, and a first electrode overlying the structure and lying within the openings. From a cross-sectional view, the structure, at the openings, has a negative slope. From a plan view, each opening has a perimeter that may or may not substantially correspond to a perimeter of an organic electronic component. The portions of the first electrode overlying the structure and lying within the openings are connected to each other. In a process for forming the electronic device, an organic active layer may be deposited within the opening, wherein the organic active layer has a liquid composition.
NTIS
Electronic Equipment; Electrical Engineering

20070005046 Griecci (John A.) Law Office, Hemosa Beach, CA, USA
Lamination Cooling System Formation Methods
Rippel, W. E.; Kobayashi, D. M.; 3 Oct 05; 28 pp.; In English
Contract(s)/Grant(s): DE-FG03-OOER829-40
Patent Info.: Filed Filed 3 Oct 05; US-Patent-Appl-SN-11-242-823
Report No.(s): PB2007-103879; No Copyright; Avail.: CASI: A03, Hardcopy

An electric motor, transformer or inductor having a lamination cooling system comprising a stack of laminations, each defining a plurality of apertures at least partially coincident with apertures of adjacent laminations. The apertures define a plurality of cooling-fluid passageways through the lamination stack, and gaps between the adjacent laminations are sealed to prevent a liquid cooling fluid in the passageways from escaping between the laminations. The gaps are sealed by injecting a heat-cured sealant into the passageways, expelling excess sealant, and heat-curing the lamination stack. The apertures of each lamination can be coincident with the same-sized apertures of adjacent laminations to form straight passageways, or they can vary in size, shape and/or position to form non-axial passageways, angled passageways, bidirectional passageways, and manifold sections of passageways that connect a plurality of different passageway sections. Manifold members adjoin opposite ends of the lamination stack, and each is configured with one or more cavities to act as a manifold to adjacent passageway ends. Complex manifold arrangements can create bidirectional flow in a variety of patterns.
NTIS
Cooling Systems; Electric Motors; Laminates

20070005078 Hamilton, Brook, Smith and Reynolds, Concord, MA, USA
Large Mode-Area Microstructure Optical Fiber
Ranka, J. K.; 11 Mar 05; 15 pp.; In English
Contract(s)/Grant(s): F19628-00-C-0002
Patent Info.: Filed Filed 11 Mar 05; US-Patent-Appl-SN-11-077 982
Report No.(s): PB2007-101285; No Copyright; Avail.: CASI: A03, Hardcopy

A large mode-area microstructured optical fiber includes a core, at least one axially oriented element disposed in the core, and a cladding about the core. The axially oriented element has a refractive index less than a refractive index of the core. The axially oriented element(s) defines sectional regions in the core. The sectional regions defined by the axially oriented element(s) can discriminate between symmetric and antisymmeteric modes of an optical beam that propagates through the optical fiber.
NTIS
Microstructure; Optical Fibers; Light Beams

20070005082 Johns Hopkins Univ., Laurel, MD, USA

Digital Nulling Pulse Inductive Metal Detector

Nelson, C. V.; 16 Sep 04; 11 pp.; In English
Contract(s)/Grant(s): DAAB-15-00-C-1008
Patent Info.: Filed Filed 16 Sep 04; US-Patent-Appl-SN-10-942-145
Report No.(s): PB2007-100949; No Copyright; Avail.: CASI: A03, Hardcopy

A method of improving pulse inductive metal detector sensitivity by minimizing adverse ground responses and transmitter coil transients is disclosed. The method provides a calibration mode for a typical pulsed EMI metal detector. The purpose of the calibration mode is to determine and record a nulling signal representative of the transmitter coil coupling to the receiver coil and a ground response that has no metal. The nulling signal is then used during normal operation of the metal detector by combining it with the instant receiver coil signal in a difference amplifier. The difference amplifier effectively subtracts the nulling signal from the instant signal yielding a response signal that has removed the ground response that may be present in the instant signal. The metal detector can be periodically re-calibrated. It may also be re-calibrated upon discovery of a metal target to provide the most up to date nulling signal for the ground around the metal target.

NTIS

Signal Processing; Digital Techniques; Target Recognition; Amplifiers; Electromagnetic Interference

20070005083 Johns Hopkins Univ., Laurel, MD, USA

Step Current Inductive Antenna for Pulse Inductive Metal Detector

Nelson, C. V.; Cooperman, C. B.; 16 Sep 04; 12 pp.; In English
Contract(s)/Grant(s): DAAB-15-00-C-1008
Patent Info.: Filed Filed 16 Sep 04; US-Patent-Appl-SN-10-942-160
Report No.(s): PB2007-100948; No Copyright; Avail.: CASI: A03, Hardcopy

A device and method to improve pulse inductive metal detector (MD) sensitivity uses multiple, current steps to reduce the voltage rating of electronic components. Current reduction in one implementation is done with multiple switched resistors coupled to a voltage source and connected to the transmitter coil. The current reduction in another implementation is done with multiple switched current sources that are connected to the transmitter coil and are switched inactive one by one to reduce the total current to the transmitter coil. The current is stepped down in rapid secession with a time delay between current transitions less than the time constant of the metal target under investigation.

NTIS

Target Recognition; Infrared Detectors; Signal Processing; Antennas; Current Regulators

20070005084 National Hispanic Univ., Oakland, CA, USA

Magnetoelectric Multilayer Composites for Field Conversion

Srinivasan, G.; 14 Sep 04; 39 pp.; In English
Contract(s)/Grant(s): NSF-DMR-0072144
Patent Info.: Filed Filed 14 Sep 04; US-Patent-Appl-SN-10-940-139
Report No.(s): PB2007-100947; No Copyright; Avail.: CASI: A03, Hardcopy

Magnetoelectric multilayer composites comprising alternate layers of a bimetal ferrite wherein one of the metals is zinc and a piezoelectric material for facilitating conversion of an electric field into a magnetic field or vice versa. The preferred composites include cobalt, nickel, or lithium zinc ferrite and PZT films which are arranged in a bilayer or in alternating layers, laminated, and sintered at high temperature. The composites are useful in sensors for detection of magnetic fields (10); sensors for measuring rotation speed, linear speed, or acceleration; read-heads in storage devices by converting bits in magnetic storage devices to electrical signals; magnetoelectric media for storing information; and high frequency devices for electric field control of magnetic devices or magnetic field control of electric devices.

NTIS

Composite Materials; Bimetals; Signal Processing; Electric Fields; Magnetic Fields

20070005086 Chico State Coll., CA, USA

Method and System for Determining the Position of a Short Circuit in a Branched Wiring System

Rogovin, D. N.; 29 Jul 04; 22 pp.; In English
Contract(s)/Grant(s): FAA-DTFA-03-C-00014

Patent Info.: Filed Filed 29 Jul 04; US-Patent-Appl-SN-10-902-522
Report No.(s): PB2007-103872; No Copyright; Avail.: CASI: A03, Hardcopy

Methods, systems, and articles of manufacture consistent with the present invention provide for determining the location of a short circuit in a branched wiring system. The distance from the short circuit to an impedance measurement point is determined based on a measured impedance of the branched wiring system. The branch in which the short circuit is located is then determined by identifying a calculated high-frequency impedance phase spectrum for the branched wiring system with one of the branches short-circuited that correlates to a measured high-frequency impedance phase spectrum for the branched wiring system. The measured high-frequency impedance phase spectrum is measured from the impedance measurement point.
NTIS
Patent Applications; Short Circuits; Wiring

20070005087 Chico State Coll., CA, USA
Methods and Systems for Detecting and Locating Damage in a Wire
Rogovin, D. N.; 29 Jul 04; 25 pp.; In English
Contract(s)/Grant(s): FAA-DTFA-03-C-00014
Patent Info.: Filed Filed 29 Jul 04; US-Patent-Appl-SN-10-901-878
Report No.(s): PB2007-103871; No Copyright; Avail.: CASI: A03, Hardcopy

Methods, systems, and articles of manufacture consistent with the present invention provide for identifying and locating wire damage on a wire. Broadband impedance phase and magnitude information for the wire is obtained. Potential wire damage on the wire is identified by analyzing the wire's low-frequency impedance phase information. The location of the wire damage is found by analyzing the wire's low-frequency impedance magnitude information.
NTIS
Damage; Damage Assessment; Detection; Patent Applications; Position (Location); Wire

20070005088 Chico State Coll., CA, USA
Methods and Systems for Testing Wire Insulation
Rogovin, D. N.; Kendig, M. W.; 29 Jul 04; 12 pp.; In English
Contract(s)/Grant(s): FAA-DTFA-03-C-0014
Patent Info.: Filed Filed 29 Jul 04; US-Patent-Appl-SN-10-902-513
Report No.(s): PB2007-103870; No Copyright; Avail.: CASI: A03, Hardcopy

Methods, systems, and articles of manufacture consistent with the present invention provide for determining the environmental resistance of a wire insulation. The broadband impedance of the wire is obtained before and after the wire is exposed to an environmental condition. The real and imaginary components of the dielectric functions are then extracted from the broadband impedances. A tangent of a ratio of the imaginary component to the real component of the dielectric function of the wire prior to exposure is compared to a tangent of a ratio of the imaginary component to the real component of the dielectric function of the wire after to exposure. The two tangents are then compared to determine the environmental resistant of the insulation.
NTIS
Electrical Insulation; Insulation; Patent Applications; Wire

20070005093 Sonnenschein Nath and Rosenthal, Washington, DC, USA
Method and System for Identifying Damage to a Wire
Rogovin, D. N.; Kendig, M. W.; 29 Jul 04; 16 pp.; In English
Contract(s)/Grant(s): FAA-DTFA-03-C-00014
Patent Info.: Filed Filed 29 Jul 04; US-Patent-Appl-SN-10-901-577
Report No.(s): PB2007-103869; No Copyright; Avail.: CASI: A03, Hardcopy

Methods, systems, and articles of manufacture consistent with the present invention determine the type of damage to a wire, the amount of damage, and the location of the damage based on the wire's broadband impedance measured from a single measurement point. The type of damage is determined by comparing the wire's calculated dielectric function, resistance and inductance to known values that correspond to types of wire damage. The amount of damage is determined by comparing the wire's low-frequency impedance phase to known low-frequency impedance phase information that corresponds to a known amount of wire damage. The location of damage is determined by comparing the wire's high-frequency impedance phase to

known high-frequency impedance phase information that corresponds to a known location of wire damage.
NTIS
Damage; Damage Assessment; Identifying; Patent Applications; Wire

20070005101 Illinois Univ., Urbana-Champaign, IL, USA
Tem Mems Device Holder and Method of Fabrication
Zhang, M.; Petrov, I.; Wen, J.; Stach, E. A.; Allen, L. H.; 28 Jul 05; 13 pp.; In English
Contract(s)/Grant(s): DEFG02-91-ER54539; DEAC03-76SF00098
Patent Info.: Filed Filed 28 Jul 05; US-Patent-Appl-SN-11-192-300
Report No.(s): PB2007-103840; No Copyright; Avail.: CASI: A03, Hardcopy

A device and method for fabricating a device holder for use with a standard holder body of a transmission electron microscope for use with in situ microscopy of both static and dynamic mechanisms. One or more electrical contact fingers is disposed between a baseplate and a frame, with a MEMS device making contact with the electrical contact fingers. A connector is provided to matingly engage the transmission electron microscope and the device holder to couple the device holder to the transmission electron microscope. Once clamped between the baseplate and frame, the electrical contact fingers may be separated from the template.
NTIS
Electron Microscopes; Fabrication; Holders; Microelectromechanical Systems; Patent Applications

20070005104 Vanderbilt Univ., Nashville, TN, USA, Auburn Univ., AL, USA
Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects
Chung, G. Y.; Tin, C. C.; Williams, R.; McDonald, K.; De Ventra, M.; 5 May 05; 12 pp.; In English
Contract(s)/Grant(s): DARPA-MDA972-1-0007
Patent Info.: Filed Filed 5 May 05; US-Patent-Appl-SN-11-122-474
Report No.(s): PB2007-103839; No Copyright; Avail.: CASI: A03, Hardcopy

In one aspect the present invention provides a method for manufacturing a silicon carbide semiconductor device. A layer of silicon dioxide is formed on a silicon carbide substrate and nitrogen is incorporated at the silicon dioxide/silicon carbide interface. In one embodiment, nitrogen is incorporated by annealing the semiconductor device in nitric oxide or nitrous oxide. In another embodiment, nitrogen is incorporated by annealing the semiconductor device in ammonia. In another aspect, the present invention provides a silicon carbide semiconductor device that has a 4H-silicon carbide substrate, a layer of silicon dioxide disposed on the 4H-silicon carbide substrate and a region of substantial nitrogen concentration at the silicon dioxide/silicon carbide interface.
NTIS
Defects; Dioxides; Metal Oxide Semiconductors; Nitrogen; Nitrogen Dioxide; Passivity; Patent Applications; Silicon; Silicon Carbides; Silicon Dioxide

20070005106 Illinois Univ., Urbana-Champaign, IL, USA
Methods for Controlling Dopant Concentration and Activation in Semiconductor Structers
Seebauer, E. G.; Braatz, R. D.; Jung, M. Y. L.; Gunawan, R.; 28 Jul 05; 36 pp.; In English
Contract(s)/Grant(s): NSF-CTS-98-06329; NSF-02-03237
Patent Info.: Filed Filed 28 Jul 05; US-Patent-Appl-SN-11-192-339
Report No.(s): PB2007-103838; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention provides methods for fabricating semiconductor structures and devices, particularly ultra-shallow doped semiconductor structures exhibiting low electrical resistance. Methods of the present invention use modification of the composition of semiconductor surfaces to allow fabrication of a doped semiconductor structure having a selected dopant concentration depth profile, which provides useful junctions and other device components in microelectronic and nanoelectronic devices, such as transistors in high density integrated circuits. Surface modification in the present invention also allows for control of the concentration and depth profile of defects, such as interstitials and vacancies, in undersaturated semiconductor materials.
NTIS
Metal Oxide Semiconductors; Patent Applications; Semiconductor Devices; Semiconductors (Materials)

20070005111 Ssenterfitt (Akerman), West Palm Beach, FL, USA

High Sensitivity Array-Based Detection System

Allman, S. L.; Farquar, H. D.; Chen, C. H.; 30 Jul 04; 9 pp.; In English
Contract(s)/Grant(s): NIJ-2089Q362A1
Patent Info.: Filed Filed 30 Jul 04; US-Patent-Appl-SN-10-903-569
Report No.(s): PB2007-103836; No Copyright; Avail.: CASI: A02, Hardcopy

A high sensitivity array-based detection system includes a plurality of probes immobilized onto a plurality of locations provided on a surface of a patterned array, such as a microarray. At least one target selectively binds to at least one of the plurality of probes when disposed proximate thereto under appropriate conditions, such as temperature and pH. The target includes at least one bound particle. The bound particle includes a plurality of label molecules. Alternatively, the target can be immobilized to the surface of the array, such as from a sample suspected of including the target. An excitation light source provides excitation light incident to one or more locations on the patterned array. A photodetector detects emanated signals from the patterned array. The photodetector can be a commercially available digital camera.

NTIS

Detection; Patent Applications; Photometers; Sensitivity

20070005128 NASA Goddard Space Flight Center, Greenbelt, MD, USA

How Does Collisionless Magnetic Reconnection Work in the Presence of a Guide Magnetic Field?

Hesse, Michael; [2006]; 1 pp.; In English; Cosmic Plasma Physics Consortium, 30-31 Oct. 2006, Bochum, Germany; No Copyright; Avail.: Other Sources; Abstract Only

The dissipation mechanism of guide field magnetic reconnection remains a subject of intense scientific interest. On one hand, one set of recent studies have shown that particle inertia-based processes, which include thermal and bulk inertial effects, provide the reconnection electric field in the diffusion region. On the other hand, a second set of studies emphasizes the role of wave-particle interactions in providing anomalous resistivity in the diffusion region. In this presentation, we present analytical theory results, as well as 2.5 and three-dimensional PIC simulations of guide-field magnetic reconnection. We will show that diffusion region scale sizes in moderate and large guide field cases are determined by electron Larmor radii, and that analytical estimates of diffusion region dimensions need to include description of the heat flux tensor. The dominant electron dissipation process appears to be based on thermal electron inertia, expressed through nongyrotropic electron pressure tensors. We will argue that this process remains viable in three dimensions by means of a detailed comparison of high resolution particle-in-cell simulations.

Author

Magnetic Field Reconnection; Simulation; Energy Dissipation; Three Dimensional Models

20070005198 Massachusetts Inst. of Tech., Cambridge, MA USA

Procedural Layout of a High-Speed Floating-Point Arithmetic Unit

Armstrong, Robert C; Jun 1985; 118 pp.; In English
Contract(s)/Grant(s): F49620-84-C-0004
Report No.(s): AD-A459612; RLE-TR-508; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459612; Avail.: CASI: A06, Hardcopy

This thesis presents a case study in the procedural design of the layout of a complex digital circuit. This is the task of writing a program which constructs a VLSI circuit layout given a set of variable parameters which specify the desired functionality of the circuit. We present a set of techniques for guaranteeing that the constructed circuit obeys the geometric and electrical design rules imposed by the underlying circuit technology. These include a set of simple circuit forms and composition rules for building precharged combinatorial circuits which are free of critical race conditions and charge-sharing problems. As an example, we carry out the creation of a program for building a floating-point addition unit which has selectable number of bits of exponent and fraction in the floating-point representation. The high-level design of a companion floating-point multiplication unit is also discussed.

DTIC

Arithmetic and Logic Units; Digital Electronics; Floating Point Arithmetic; High Speed; Layouts; Logic Circuits

20070005207 Massachusetts Inst. of Tech., Cambridge, MA USA

Macromodeling CMOS Circuits for Timing Simulation

Brocco, Lynne M; Jun 1987; 96 pp.; In English
Contract(s)/Grant(s): AFOSR-86-0164

Report No.(s): AD-A459654; RLE TR-459; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459654; Avail.: CASI: A05, Hardcopy

A macromodeling and timing simulation technique is presented that allows fast, accurate delay calculations for CMOS circuits. This method is well suited for delay calculations of regular structure VLSI circuits, as well as circuits designed from standard cell libraries. Timing models for both logic gate and transmission gate circuit forms are developed. For logic gates, output transition time and delay time are functions of input transition time and load impedance. Effective resistances for conducting transmission gates and switching transmission gates are functions of input transition time and load capacitance. Transmission gate circuits are then modeled as equivalent RC circuits. Separate waveform models and delay calculation methods exist for both types of circuit forms, with an interface to enable the use of both methods in the same simulation. An experimental event-driven simulator was developed to test the accuracy of the macromodels and to estimate improvements in execution time with respect to SPICE. Typical delay times were within 5% for logic gate circuits and 10% for transmission gate circuits when compared with SPICE. The execution time of the experimental simulator was over two orders of magnitude faster than SPICE.

DTIC

Accuracy; Circuits; CMOS; Simulation; Very Large Scale Integration

20070005215 Massachusetts Inst. of Tech., Cambridge, MA USA

Graph-based Representations and Coupled Verification of VLSI Schematics and Layouts

Bamji, Cyrus S; Oct 1989; 202 pp.; In English

Contract(s)/Grant(s): AFOSR-86-0164

Report No.(s): AD-A459681; MIT-RLE-TR-547; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459681; Avail.: CASI: A10, Hardcopy

Structural verification of Very Large Scale Integration (VLSI) schematics and layouts is formalized. Both schematics and layouts are modeled as graphs and structural correctness is tied to a rigorous set of graph composition rules which define how blocks of schematics and layouts may be composed. Novel, non-heuristic verification techniques which allow structural verification to be performed for a continuum of schematic and layout block sizes are introduced. Using one potent structural verification mechanism, these techniques provide a unified approach to schematic design style verification, layout design rule verification and schematic vs. layout comparison. The verification techniques are fast and can be performed incrementally as the schematics and layouts are created. For schematic design style verification the composition rules are captured by graph transformations akin to context free grammatical productions. The productions describe how a small set of module symbols may be composed. Using these productions a hierarchical parse tree that can demonstrate the correctness of the schematic is constructed. For layouts the composition rules are represented by graph templates. Design rule verification is achieved by covering the layout graph with these templates. Schematic vs. layout correspondence verification is achieved by allowing individual templates to span both schematics and layouts and simultaneously covering the schematic and layout with these templates.

DTIC

Electric Networks; Layouts; Network Analysis; Very Large Scale Integration

20070005222 Mitre Corp., Bedford, MA USA

Multipath Mitigation Performance of Planar GPS Adaptive Antenna Arrays for Precision Landing Ground Stations

Williams, Jonathan H; Davis, Robert J; Rosario, Eddie N; Jan 2000; 9 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459739; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459739; Avail.: CASI: A02, Hardcopy

No abstract available

Adaptation; Antenna Arrays; Global Positioning System; Ground Stations; Multipath Transmission

20070005226 Army Research Lab., Aberdeen Proving Ground, MD USA

Numerical Methods for Analysis of Charged Vacancy Diffusion in Dielectric Solids

Clayton, John D; Chung, Peter W; Greenfield, Michael A; Nothwang, WIlliam D; Dec 2006; 40 pp.; In English

Report No.(s): AD-A459751; ARL-TR-4002; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459751; Avail.: Defense Technical Information Center (DTIC)

A theory for charged vacancy diffusion in elastic dielectric materials is formulated and implemented numerically in a finite difference code. The governing equations consist of Maxwell's equations of electrostatics coupled with kinetic equations for

vacancy diffusion, with the chemical potential accounting for both mixing energy of vacancies and electrostatically-driven charge migration. A second-order accurate implicit scheme is used to solve Maxwell's parabolic equations, while an explicit method is used to integrate the elliptic evolution equations for transient vacancy concentration. In addition to the theoretical background and numerical methodology, user documentation is included for the computer implementation, presently limited to one-dimensional analysis. Provided here are descriptions of the code structure, user instructions, and a representative application of the software for analysis of barium strontium titanate thin films containing charged oxygen vacancies. The source code is included in the appendix.
DTIC
Coding; Computer Programs; Dielectrics; Diffusion; Numerical Analysis; Solids; Thin Films

20070005235 Sigma Technologies International, Inc., Tucson, AZ USA
High Energy Density Polymer Film Capacitors
Boufelfel, Ali; Oct 2006; 105 pp.; In English
Contract(s)/Grant(s): DTRA01-99-C-0082; Proj-OH
Report No.(s): AD-A459821; DTRA-TR04-15-FINAL-PH-II; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459821; Avail.: CASI: A06, Hardcopy

High-energy-density capacitors that are compact and light-weight are extremely valuable in a number of critical DoD systems that include portable field equipment, pulsed lasers, detection equipment, and electromagnetic weaponry. Commercial applications in need of high-power sources are also numerous. We can cite: high intensity flash lamps, defibrillators, lasers, and portable field generators. Applications that require high voltage, short pulse length and high rep rates are limited to low loss dielectrics such as polypropylene. Lower rep rate applications can be served with higher loss dielectrics that include polyester (PET), polyphenylene sulfide (PPS), polyethylene naphthalene (PEN) and polyvinylidene difluoride (PVDF). High-energy-density capacitors that are compact and light-weight are extremely valuable in a number of critical DoD systems that include portable field equipment, pulsed lasers, detection equipment, and electromagnetic weaponry. Commercial applications in need of high-power sources are also numerous. We can cite: high intensity flash lamps, defibrillators, lasers, and portable field generators. Applications that require high voltage, short pulse length and high rep rates are limited to low loss dielectrics such as polypropylene. Lower rep rate applications can be served with higher loss dielectrics that include polyester (PET), polyphenylene sulfide (PPS), polyethylene naphthalene (PEN) and polyvinylidene difluoride (PvDF).
DTIC
Capacitors; Flux Density; Polymeric Films

20070005241 Air Force Research Lab., Hanscom AFB, MA USA
Josephson Junction Triangular Prism Qubits Coupled to a Resonant LC Bus: Qubits and Gates for a Holonomic Quantum Computer
Yukon, Stanford P; Jan 2004; 12 pp.; In English
Contract(s)/Grant(s): Proj-2304
Report No.(s): AD-A459830; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459830; Avail.: CASI: A03, Hardcopy

We investigate the properties of Josephson junction triangular prism qubits coupled by mutual inductance to a resonant LC bus. We show how the symmetries of the qubit potential may be used to implement the Duan Cirac Zoller scheme for holonomic quantum computation.
DTIC
Josephson Junctions; Prisms

20070005261 North Carolina State Univ., Raleigh, NC USA
Radio Frequency Applications of Barium Strontium Titanate Thin Film Tunable Capacitors
Tombak, Ali; Jan 2000; 64 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459864; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459864; Avail.: CASI: A04, Hardcopy

Properties of thin film barium strontium titanate (BST) based capacitors for RF and microwave components were studied. The capacitors were measured for their tunability, loss tangent, frequency dependence of dielectric permittivity, and behavior at large RF signal amplitudes. A nonlinear equivalent circuit model for tunable BST capacitors was developed. Analysis of a tunable low pass filter fabrication using BST capacitors along with its intermodulation distortion measurements was given.

Several simulations for bandpass filters were performed. Furthermore, a periodically loaded coplanar waveguide phase shifter utilizing the BST capacitors was designed.
DTIC
Barium Titanates; Capacitors; Radio Frequencies; Strontium Titanates; Thin Films

20070005292 Air Force Research Lab., Wright-Patterson AFB, OH USA
Radiation and Scattering Compact Antenna Laboratory
Radcliffe, Joshua; Aug 2006; 21 pp.; In English
Contract(s)/Grant(s): Proj-7622
Report No.(s): AD-A459908; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459908; Avail.: CASI: A03, Hardcopy

In-house applied RF aperture development in the RASCAL laboratory. This interim report contains research centered on leaky wave antenna technology and wideband spiral antenna interferometry. Novel, thin profile, wideband apertures (leaky wave phenomena) have a bright future amongst small vehicle installation. Robust modeling, fabrication, and in-house measurement have led to unique breakthroughs in bandwidth, high efficiency, and end termination schemes. Wideband spiral antenna interferometry has been a new area of direction finding which brings wideband performance to the accuracy of interferometric systems. The validation of this system performance was successfully accomplished via in-house design and measurements.
DTIC
Antennas; Broadband; Scattering

20070005313 FOM-Inst. voor Atoom- en Molecuulfysica, Amsterdam, Netherlands
E-MRS Spring Meeting - Nanophotonic Materials Session
Polman, Albert; Lezec, Henri; Atwater, Harry A; May 27, 2004; 21 pp.; In English
Contract(s)/Grant(s): FA8655-04-1-5025
Report No.(s): AD-A459957; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459957; Avail.: CASI: A03, Hardcopy

The Final Proceedings for E-MRS Spring Meeting - Nanophotonic Materials Session 24 May 2004 - 28 May 2004 .This is an interdisciplinary conference. Topics include Surface plasmon optics in thin films Nanoparticle plasmonic structures, Nanocrystal and nanowire lasers and LEDs, Molecular scale photonics, Nanophotonic mechanisms for waveguiding in and light extraction from optoelectronic devices, Subwavelength scale imaging and pattern transfer Lithographic and non lithographic fabrication methods for nanophotonic materials. Computational methods for nanophotonic materials and devices, Negative index and left-handed materials, Nanophotonic materials for sensors, Materials and structures for inhibited/enhanced optical emission Integration of nanophotonic materials and devices with microphotonics (e.g. photonic crystal devices and other monolithic integrated photonic technologies) Subwavelength, scale photonics at non-optical (infrared microwave) frequencies.
DTIC
Electro-Optics; Nanotechnology; Optical Materials; Optical Measuring Instruments

20070005341 Air Force Research Lab., Hanscom AFB, MA USA
Improved Temperature Characteristics in Quantum Dot Lasers with Indirect-Bandgap Barriers
Soref, Richard A; Sun, Gregory; Khurgin, Jacob B; Jun 1, 2003; 4 pp.; In English
Contract(s)/Grant(s): Proj-2305
Report No.(s): AD-A459997; AFRL-SN-HS-TP-2002-1021; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459997; Avail.: CASI: A01, Hardcopy

This study demonstrates that a much high characteristic- temperature can be achieved with quantum dot lasers of indirect barrier compared to those of direct barrier. The temperature dependence of threshold current is reduced because the injected carriers residing in the barrier at high temperatures recombine slowly.
DTIC
Energy Gaps (Solid State); Lasers; Quantum Dots; Semiconductors (Materials)

20070005361 Naval Research Lab., Washington, DC USA
Application of Tactitron RCA Type 6441 to Pulse Circuitry
Cumings, Richard G; Jun 8, 1956; 32 pp.; In English
Contract(s)/Grant(s): Proj-NR-682-230

Report No.(s): AD-A460044; NRL-MR-606; XB-NRL/MR/5300; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460044; Avail.: CASI: A03, Hardcopy

The application of a grid controlled gas discharge tube, tacitron, RCA Type 6441, to radar pulse amplifiers and modulators is examined. The tacitron is found useful in some amplifier applications and one method of extending the applications with external excitation is described. As a modulator for a constant starting phase pulsed R.F. oscillator of one type, the tacitron proves to be a useable tube. As a pulse amplifier for pulse widths under 1,000 microseconds with a very low percentage distortion or as a capacity modulator, it has limited applications.

DTIC

Circuits; Thyratrons

20070005404 Massachusetts Inst. of Tech., Cambridge, MA USA

Optical Flow Computation via Multiscale Regularization

Leuttgen, Mark R; Karl, W C; Willsky, Alan S; Jun 30, 1992; 41 pp.; In English

Contract(s)/Grant(s): N00014-91-J-1004; AFOSR-88-0032

Report No.(s): AD-A460093; LIDS-P-2115; No Copyright; Avail.: CASI: A03, Hardcopy

The apparent motion of brightness patterns in an image is referred to as the optical flow. In computational vision, optical flow is an important input into higher level vision algorithms performing tasks such as segmentation, tracking, object detection, robot guidance and recovery of shape information. In addition, methods for computing optical flow are an essential part of motion compensated coding schemes. In this paper, we present a new approach to the problem of computing optical flow. Standard formulations of this problem require the computationally intensive solution of an elliptic partial differential equation which arises from the often used ‘smoothness constraint’ regularization term. We utilize the interpretation of the smoothness constraint as a ‘fractal prior’ to motivate regularization based on a recently introduced class of multiscale stochastic models. These models are associated with efficient multiscale smoothing algorithms, and experiments on several image sequences demonstrate the substantial computational savings that can be achieved through their use.

DTIC

Computational Fluid Dynamics; Optical Data Processing; Optical Properties

20070005424 Maryland Univ., Baltimore, MD USA

Analysis of PMD Compensators With Fixed DGD Using Importance Sampling

Lima, Jr , I T; Biondini, G; Marks, B S; Kath, W L; Menyuk, C R; Dec 20, 2001; 4 pp.; In English

Report No.(s): AD-A460116; No Copyright; Avail.: CASI: A01, Hardcopy

In this letter, we use importance sampling to analyze polarization-mode dispersion compensators with a constant differential group delay (DGD) element. We optimize the value of the fixed DGD element of the compensator with respect to the outage probability. We show that the optimum value of the fixed DGD element of the compensator can reduce the outage probability by several orders of magnitude, even though it does not provide a substantial reduction of the average penalty due to polarization-mode dispersion in the cases that we studied. By contrast, choosing the fixed DGD element to maximally reduce the average penalty may lead to an outage probability that is orders of magnitude larger than the optimal choice.

DTIC

Birefringence; Compensators; Fiber Optics; Optical Communication; Optical Fibers; Sampling

20070005427 North Carolina State Univ., Raleigh, NC USA

An Integrated Tool for High Speed Circuit Design Including Substrate Effects

Bollapragada, Rajesh; Jan 2003; 63 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460121; No Copyright; Avail.: CASI: A04, Hardcopy

An integrated environment for layout-oriented design of high speed circuits is the main target of this study. The simulation environment would include a full-wave electromagnetic simulator and a circuit simulator(fREEDA, with a front engine), which is the major emphasis in this document. fREEDA implements local reference node instead of a global ground and this is crucial for distributed circuits. The models are implemented in object-oriented fashion and uses automatic differentiation. The same model can be used for DC, transient and harmonic balance analysis.

DTIC

Circuits; High Speed; Integrated Circuits; Substrates

20070005441 North Carolina State Univ., Raleigh, NC USA
High Power Spatial Combiners: Tile and Tray Approaches
Ortiz, Sean C; Jan 2001; 195 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAAG55-97-0132
Report No.(s): AD-A460148; No Copyright; Avail.: CASI: A09, Hardcopy

Spatial power combining is a method of coherently combining the power of many amplifying devices using free space as the power dividing/combining medium in contrast to traditional circuit based combiners. The spatial combiner is formed from an array of amplifying unit cells, with each cell receiving a signal, amplifying it, and then radiating it into free space. Two methods of spatial power combining, tile and tray, are investigated in this thesis. The tile-based spatial combiner consists of a thick ground plane with receiving microstrip patch antennas on one side and transmitting microstrip patch antennas on the other. In addition, amplifiers are placed on both sides of the thick ground plane, which provides efficient heat removal. This research is focused on the optimal array spacing, biasing, and feeding of tile-based arrays to achieve high output power levels at Ka-band (Lockheed Martin was specifically interested in achieving greater than 25 Watts of radiated power under a DARPA MAFET-3 program). Several arrays were developed, consisting of 13, 45, and 98 elements. Noteworthy results were obtained from the experiments with this design approach. A tray-based approach is also investigated in this thesis. This approach differs from the tile-based approach by having multiple ground planes (trays) containing amplifiers stacked to form an array of amplifying unit cells. In addition, microstrip patch antennas are placed at the ends of the trays and radiate in an end-fire pattern with respect to the tray containing the amplifiers. For this purpose, an approach has been developed for the feeding of the microstrip patch antennas. This feeding mechanism allows the amplifiers and radiating elements to be isolated. Thus more room is allowed for the amplifiers, while minimizing coupling that may cause spurious oscillations. This study examines the effect of device failure on the gain, power output, and radiation pattern.
DTIC
Antenna Arrays; Extremely High Frequencies; Power Amplifiers; Tiles; Trays

20070005454 Mitre Corp., Bedford, MA USA
Measured Effects of a Narrowband Interference Suppressor on GPS Receivers
Capozza, P T; Holland, B J; Hopkinson, T M; Li, C; Moulin, D; Pacheco, P; Rifkin, R; Jun 1999; 8 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460171; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available
Global Positioning System; Narrowband; Receivers; Suppressors

20070005456 Air Force Research Lab., Hanscom AFB, MA USA
A Low-Sidelobe Partially Overlapped Constrained Feed Network for Time-Delayed Subarrays
Mailloux, Robert J; Jul 27, 2000; 13 pp.; In English
Contract(s)/Grant(s): Proj-2304
Report No.(s): AD-A460175; No Copyright; Avail.: CASI: A03, Hardcopy

Completely overlapped space-fed subarrays have been shown to provide sufficient pattern control to enable (modestly) wide-band arrays using time delays at the input to each subarray and phase shifters at the array face. These configurations are bulky, but have been proposed for space-based use as well as for certain ground-based applications that do not have severe volume constraints. Other applications for space-based and airborne radar require much more compact, constrained array feed networks, but until now there have been few appropriate constrained networks for inserting time delay at the subarray ports without causing high sidelobes. This paper describes one such network that, at the outset, provided far lower sidelobes than the usual contiguous subarrays, but retained closely spaced high lobes near the main beam. This paper presents a synthesis procedure that alters the subarray pattern and reduces nearly all array sidelobes to levels determined by tolerance errors. Several examples are presented that synthesize sidelobes at -40 dB. The resulting network operates over 70% to 80% of the maximum theoretical bandwidth.
DTIC
Antenna Feeds; Delay; Sidelobes

20070005459 Space and Naval Warfare Systems Center, San Diego, CA USA
Ultra Small Aperture Terminal (USAT) Phased Array Technology Demonstrator
Axford, Jr, Roy A; Nov 25, 2003; 6 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460178; No Copyright; Avail.: CASI: A02, Hardcopy

This paper describes a K/Ka-band ('two-way Ka') active phased array antenna and mobile terminal technology development project co-sponsored by the Office of Naval Research (ONR) Future Naval Capability (FNC) Program and the Defense Advanced Research Projects Agency (DARPA) Future Combat Systems Communications (FCSC) Program. The objective of the ONRIDARPA Ultra Small Aperture Terminal (USAT) Project is to advance the state-of-the-art in K/Ka-band active phased array antenna components and miniaturized frequency converters to provide wideband satellite communications on the move (COTM) capabilities for mobile vehicles. By using a mechanically augmented phased array (MAPA) antenna, USAT demonstrates these technologies in a prototype that requires one transmit array and one receive array to achieve full-hemispherical coverage.

DTIC

Apertures; Arrays; Phased Arrays; Proving; Satellite Communication

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20070005462 Southern Univ., Baton Rouge, LA USA

Predictive Computations of Properties of Wide-Gap and Nano-Semiconductors

Bagayoko, Diola; Zhao, G L; Jan 2007; 67 pp.; In English

Contract(s)/Grant(s): N00014-05-1-0009

Report No.(s): AD-A460186; No Copyright; Avail.: CASI: A04, Hardcopy

We report the progress made in the implementation of the afore-mentioned project. To date, we have strictly adhered to the provisions in the proposal relative to the research personnel, materials under study, and the overall research tasks (i.e., computations and theoretical analysis). We have consequently generated new knowledge that is reported in several articles. Twelve (12) articles have already been published, including six (6) in refereed journals and four (4) in refereed conference proceedings. These articles are appended to this report. We have made fourteen (14) technical presentations on our findings, including at two (2) national and two (2) international conferences. The utter significance of our findings resides in the fact that they have confirmed our resolution of a long-standing problem in materials science stemming from a 30 to 50% or more underestimation, by theory, of the measured energy gaps (atoms, molecules, and clusters) and band gaps (semiconductors and insulators). Specifically, density functional theory (DFT) and its local density approximation (LDA) had been blamed, before our work, for the resulting gross disagreements between theory and experiment. Unlike previous works, we have obtained the experimentally measured band gaps of wurtzite InN, ZnO, and of several single walled carbon nanotubes. This feat was accomplished by our utilization of the Bagayoko, Zhao, and Williams (BZW) method. Further, we have predicted the band gap of cubic InN for which no experimental results are available. It is befitting that this ONR funded project exonerated DFT and LDA that were obtained by a project funded by ONR and for which Dr. Walter Kohn received the 1998 Nobel Prize in Chemistry.

DTIC

Nanotechnology; Prediction Analysis Techniques; Predictions; Semiconductors (Materials)

20070005518 Naval Postgraduate School, Monterey, CA USA

A Methodology for Improving the Shipyard Planning Process: Using KVA Analysis, Risk Simulation and Strategic Real Options

Housel, Thomas; Hom, Sandra; Mun, Jonathan; Sep 30, 2006; 97 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460369; NPS-GSBPP-06-022; No Copyright; Avail.: CASI: A05, Hardcopy

The U.S. Navy must be extremely diligent with its maintenance policies to ensure that ships and submarines meet national defense objectives. Maximizing the Navy s readiness requires continuous process improvement and innovation, and making information technology (IT) acquisitions that leverage technological advances to reduce costs and increase efficiency levels. Measurement tools are essential to define, capture, measure and evaluate the total value of potential IT acquisitions to ensure the likelihood of success. This paper describes research conducted on the Knowledge Value Added/Real Options (KVA+RO) Valuation Framework. A comprehensive tool, KVA+RO was applied to Naval maintenance processes in a case study analyzing

DTIC

Commercial Off-the-Shelf Products; Maintenance; Policies; Risk; Shipyards; Simulation; Systems Integration

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*.

20070003678 NASA Ames Research Center, Moffett Field, CA, USA
Arcjet Semi-Elliptic Nozzle Simulations and Validation in Support of TPS Testing
Loomis, Mark; Polsky, Susan; Venkatapaty, Ethiraj; Bailboni, John; Terrazas-Salinas, Imelda; [2998]; 1 pp.; In English; 36th AIAA Aerospace Sciences Meeting and Exhibit, 12-15 Jan. 1998, Reno, NV, USA
Contract(s)/Grant(s): RTOP 242-33-01; No Copyright; Avail.: Other Sources; Abstract Only

Much of the ground based testing of advanced thermal protection system (TPS) components for the X33 program is done in arc-heated wind tunnels such as those located in the Arc-Jet Complex at NASA Ames Research Center. These facilities are capable of simulating the high temperature, chemically reacting flow environment experienced by the vehicle during flight. This allows one to test critical design issues such as maximum reuse temperatures, seals, gaps, and increases in heating due to interfaces between different materials. Computational fluid dynamics (CFD) has evolved to the point where it now can be used in the vehicle design process for accurate and timely prediction of trajectory based aerothermal heating environments for re-entry vehicles. It can also be used for simulation of the flow environments in ground based facilities such as arcjets. By utilization of the same CFD code and solution methodology, the important differences between ground test and flight may be quantified. The goal of this paper is to utilize CFD to provide validated simulations of the flow environment in the NASA-Ames semi elliptic nozzle arcjet facilities. The validation of the ground simulations will come From comparison to existing calibration data. Specific tests in support of the X33 TPS test program will ilso be simulated. In this manner, the differences between the ground test simulation and the flight environment can be identified for a measure of ground test to flight traceability.
Author
Computational Fluid Dynamics; Simulation; Thermal Protection; Nozzle Design; Arc Jet Engines; Wind Tunnel Tests

20070003681 NASA Johnson Space Center, Houston, TX, USA
Assessment of Turbulent Shock-Boundary Layer Interaction Computations Using the OVERFLOW Code
Oliver, A. B.; Lillard, R. P.; Schwing, A. M.; Blaisdell, G\g A.; Lyrintzis, A. S.; [2007]; 26 pp.; In English; 45th AIAA Aerospace Sciences Meeting, 8-12 Jan. 2007, Reno, NV, USA
Contract(s)/Grant(s): NNJ04HI12G; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003681; Avail.: CASI: A03, Hardcopy

The performance of two popular turbulence models, the Spalart-Allmaras model and Menter s SST model, and one relatively new model, Olsen & Coakley s Lag model, are evaluated using the OVERFLOWcode. Turbulent shock-boundary layer interaction predictions are evaluated with three different experimental datasets: a series of 2D compression ramps at Mach 2.87, a series of 2D compression ramps at Mach 2.94, and an axisymmetric coneflare at Mach 11. The experimental datasets include flows with no separation, moderate separation, and significant separation, and use several different experimental measurement techniques (including laser doppler velocimetry (LDV), pitot-probe measurement, inclined hot-wire probe measurement, preston tube skin friction measurement, and surface pressure measurement). Additionally, the OVERFLOW solutions are compared to the solutions of a second CFD code, DPLR. The predictions for weak shock-boundary layer interactions are in reasonable agreement with the experimental data. For strong shock-boundary layer interactions, all of the turbulence models overpredict the separation size and fail to predict the correct skin friction recovery distribution. In most cases, surface pressure predictions show too much upstream influence, however including the tunnel side-wall boundary layers in the computation improves the separation predictions.
Author
Boundary Layers; Computational Fluid Dynamics; Shock Wave Interaction; Turbulence Models

20070003682 NASA Marshall Space Flight Center, Huntsville, AL, USA
NASA/MSFC's Calculation for Test Case 1a of ATAC-FSDC Workshop on After-body and Nozzle Flows
Ruf, Joseph H.; November 16, 2006; 4 pp.; In English; ATAC-FSCD Workshop on Afterbody and Nozzle Flows, 15-16 Nov. 2006, Noordwijk, Netherlands; Original contains color and black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003682; Avail.: CASI: A01, Hardcopy

Mr. Ruf of NASA/MSFC executed the CHEM computational fluid dynamics (CFD) code to provide a prediction of the test case 1 a for the ATAC-FSDC Workshop on After-body and Nozzle Flows. CHEM is used extensively at MSFC for a wide

variety of fluid dynamic problems. These problems include; injector element flows, nozzle flows, feed line flows, turbomachinery flows, solid rocket motor internal flows, plume vehicle flow interactions, etc.
Author
Afterbodies; Computational Fluid Dynamics; Nozzle Flow; Solid Propellant Rocket Engines

20070003715 Army Research Lab., Aberdeen Proving Ground, MD USA
Application of Computational Fluid Dynamics to a Preliminary Extended Area Protection System (EAPS) Projectile
Sep 2006; 30 pp.; In English
Contract(s)/Grant(s): Proj-622618H80
Report No.(s): AD-A459349; ARL-MR-649; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Computational Fluid Dynamics; Projectiles; Protection

20070004666 Louisiana State Univ., Baton Rouge, LA USA
Boussinesq Modeling of Alongshore Swash Zone Currents
Dec 2006; 20 pp.; In English
Contract(s)/Grant(s): N00014-04-1-0310
Report No.(s): AD-A459755; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Splashing; Models; Wave Propagation; Shorelines; Water Currents

20070004719 Sandia Corp., Albuquerque, NM, USA
Mobile Monolithic Polymer Elements for Flow Control in Microfluidic Devices
Hasselbrink, E. F.; Rehm, J. E.; Shepodd, T. J.; Kirby, B. J.; 4 Sep 03; 20 pp.; In English
Patent Info.: Filed Filed 4 Sep 03; US-Patent-Appl-SN-10-655 337
Report No.(s): PB2007-100878; No Copyright; Avail.: CASI: A03, Hardcopy

A cast-in-place and lithographically shaped mobile, monolithic polymer element for fluid flow control in microfluidic devices and method of manufacture. Microfluid flow control devices, or microvalves that provide for control of fluid or ionic current flow can be made incorporating a cast0in-place, mobile monolithic polymer element, disposed within a microchannel, and driven by fluid pressure (either liquid or gas) against a retaining or sealing surface. The polymer elements are made by the application of lithographic methods to monomer mixtures formulated in such a way that the polymer will not bond to microchannel walls. The polymer elements can seal against pressures greater than 5000 psi, and have a response time on the order of milliseconds. By the use of energetic radiation it is possible to depolymerize selected regions of the polymer element to form shapes that cannot be produced by conventional lithographic patterning and would be impossible to machine.
NTIS
Control Equipment; Microfluidic Devices; Polymers

20070004720 Los Alamos National Lab., NM USA
Noninvasive Characterization of a Flowing Multiphase Fluid Using Ultrasonic Interferometry
18 Nov 04; 17 pp.; In English
Contract(s)/Grant(s): DE-W-7405-ENG-36
Patent Info.: Filed Filed 18 Nov 04; US-Patent-Appl-SN-10-993 045
Report No.(s): PB2007-100877; No Copyright; Avail.: CASI: A03, Hardcopy

An apparatus for noninvasively monitoring the flow and/or the composition of a flowing liquid using ultrasound is described. The position of the resonance peaks for a fluid excited by a swept-frequency ultrasonic signal have been found to change frequency both in response to a change in composition and in response to a change in the flow velocity thereof. Additionally, the distance between successive resonance peaks does not change as a function of flow, but rather in response to a change in composition. Thus, a measurement of both parameters (resonance position and resonance spacing), once calibrated, permits the simultaneous determination of flow rate and composition using the apparatus and method of the present invention.
NTIS
Interferometry; Ultrasonics

20070004847 National Inst. of Standards and Technology, Gaithersburg, MD, USA

Benchmark Experimental Database for Multiphase Combustion Model Input and Validation: A Users Follow-Up

Presser, C.; January 2005; 6 pp.; In English

Report No.(s): PB2007-105058; No Copyright; Avail.: CASI: A02, Hardcopy

Optimization of the performance of industrial combustion systems is relying increasingly on computational models and simulations to provide relevant process information in a cost-effective manner. Although computational fluid dynamics (CFD) offers a cost-effective alternative to experiments, the accuracy of the CFD models must first be assured. This is accomplished by two means: verification and validation. This paper describes a benchmark case suitable for validation of multiphase combustion models and submodels. The benchmark includes a reference spray combustor to provide well-defined input and boundary conditions, enabling measurements to characterize the fuel spray, combustion air, wall temperatures, exhaust gas temperatures and species concentrations. The characteristics (i.e., size, velocity, volume flux, etc.) of the methanol spray were determined using phase Doppler interferometry. Fourier-transform infrared spectroscopy was used to measure species concentrations in the reactor exhaust and the conversion of methanol. The inlet combustion air was characterized using particle image velocimetry and a five-hole pitot probe. The measurements constitute a database sufficiently complete for code validation; subsequently, several research groups have carried out simulations of the facility to varying degrees of success. This paper describes the development of the database and some of the modeling issues and needs.

NTIS

Combustion; Combustion Physics; Data Bases; Fluid Dynamics

20070004850 National Inst. of Standards and Technology, Gaithersburg, MD USA, Hughes Associates, Inc., Baltimore, MD, USA

Fire Dynamics Simulator (Version 3) User's Guide

McGrattan, K. B.; Forney, G. P.; Floyd, J. E.; Hostikka, S.; Prasad, K.; Nov. 2002; 81 pp.; In English

Report No.(s): PB2007-105106; NISTIR-6784-2002-ED; No Copyright; Avail.: National Technical Information Service (NTIS)

Fire Dynamics Simulator (FDS) is a computational fluid dynamics (CFD) model of fire-driven fluid flow. The software described in this document solves numerically a form of the Navier-Stokes equations appropriate for low-speed, thermally-driven flow with an emphasis on smoke and heat transport from fires. The formulation of the equations and the numerical algorithm are contained in a companion document, called Fire Dynamics Simulator (Version 3) Technical Reference Guide. Smokeview is a visualization program that is used to display the results of an FDS simulation. The basics of Smokeview are described in this document. A more detailed description can be found in a companion document, called Users Guide for Smokeview Version 3.1 A Tool for Visualizing Fire Dynamics Simulation Data.

NTIS

Combustion Physics; Computational Fluid Dynamics; Fires; Simulators

20070004851 National Inst. of Standards and Technology, Gaithersburg, MD USA

Fire Dynamics Simulation (Version 2): Technical Reference Guide

McGrattan, K. B.; Baum, H. R.; Rehm, R. G.; Hamins, A.; Forney, G. P.; Nov. 2001; 48 pp.; In English

Report No.(s): PB2007-105062; NISTIR-6783; No Copyright; Avail.: CASI: A03, Hardcopy

The idea that the dynamics of a fire might be studied numerically dates back to the beginning of the computer age. Indeed, the fundamental conservation equations governing fluid dynamics, heat transfer, and combustion were first written down over a century ago. Despite this, practical mathematical models of fire (as distinct from controlled combustion) are relatively recent due to the inherent complexity of the problem. Indeed, in his brief history of the early days of fire research, Hoyt Hottel noted A case can be made for fire being, next to the life processes, the most complex of phenomena to understand. The difficulties revolve about three issues: First, there are an enormous number of possible fire scenarios to consider due to their accidental nature. Second, the physical insight and computing power necessary to perform all the necessary calculations for most fire scenarios are limited. Any fundamentally based study of fires must consider at least some aspects of bluff body aerodynamics, multi-phase flow, turbulent mixing and combustion, radiative transport, and conjugate heat transfer; all of which are active research areas in their own right. Finally, the fuel in most fires was never intended as such. Thus, the mathematical models and the data needed to characterize the degradation of the condensed phase materials that supply the fuel may not be available. Indeed, the mathematical modeling of the physical and chemical transformations of real materials as they burn is still in its infancy. In order to make progress, the questions that are asked have to be greatly simplified. To begin with, instead of seeking a methodology that can be applied to all fire problems, we begin by looking at a few scenarios that seem to be most amenable to analysis. Hopefully, the methods developed to study these simple problems can be generalized over time so that more complex scenarios can be analyzed. Second, we must learn to live with idealized descriptions of fires and approximate solutions to our idealized equations. Finally, the methods should be capable of systematic improvement. As our physical insight and computing power grow more powerful, the methods of analysis can grow with them. To date, three distinct approaches to the simulation of fires have emerged. Each of these treats the fire as an inherently three dimensional process evolving in time. The first to reach maturity, the zone models, describe compartment fires. Each compartment is divided into two spatially homogeneous volumes, a hot upper layer and a cool lower layer. Mass and energy balances are enforced for each layer, with additional models describing other physical processes appended as differential or algebraic equations as appropriate. Examples of such phenomena include fire plumes, flows through doors, windows and other vents, radiative and convective heat transfer, and solid fuel pyrolysis. An excellent description of the physical and mathematical assumptions behind the zone modeling concept is given by Quintiere, who chronicles developments through 1983. Model development since then has progressed to the point where documented and supported software implementing these models are widely available.

NTIS

Combustion Physics; Computational Fluid Dynamics; Fires; Simulation

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20070004940 Lockheed Martin Energy Systems, Inc., Oak Ridge, TN, USA

Methods for Forming Small-Volume Electrical Contacts and Material Manipulations with Fluidic Microchannels

Jacobson, S. C.; Ramsey, J. M.; 23 Sep 03; 30 pp.; In English

Contract(s)/Grant(s): DE-AC05-96-OR22464

Patent Info.: Filed Filed 23 Sep 03; US-Patent-Appl-SN-10-668 930

Report No.(s): PB2007-100885; No Copyright; Avail.: CASI: A03, Hardcopy

A microfabricated device employing a bridging membrane and methods for electrokinetic transport of a liquid phase biological or chemical material using the same are described. The bridging membrane is deployed in or adjacent to a microchannel and permits either ionic current flow or the transport of gas species, while inhibiting the bulk flow of material. The use of bridging membranes in accordance with this invention is applicable to a variety of processes, including electrokinetically induced pressure flow in a region of a microchannel that is not influenced by an electric field, sample concentration enhancement and injection, as well as improving the analysis of materials where it is desired to eliminate electrophoretic bias. Other applications of the bridging membranes according to this invention include the separation of species from a sample material, valving of fluids in a microchannel network, mixing of different materials in a microchannel, and the pumping of fluids.

NTIS

Electric Contacts; Fluidics; Microchannels; Patent Applications

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20070005051 Sandia National Labs., Albuquerque, NM USA

Validation Experiments to Determine Radiation Partitioning of Heat Flux to an Object in a Fully Turbulent Fire

Ricks, A.; Blanchat, T.; Jernigan, D.; Jun. 2006; 80 pp.; In English

Report No.(s): DE2006-887481; SAND2006-3494; No Copyright; Avail.: National Technical Information Service (NTIS)

It is necessary to improve understanding and develop validation data of the heat flux incident to an object located within the fire plume for the validation of SIERRA/ FUEGO/SYRINX fire and SIERRA/CALORE. One key aspect of the validation data sets is the determination of the relative contribution of the radiative and convective heat fluxes. To meet this objective, a cylindrical calorimeter with sufficient instrumentation to measure total and radiative heat flux had been designed and fabricated. This calorimeter will be tested both in the controlled radiative environment of the Penlight facility and in a fire environment in the FLAME/Radiant Heat (FRH) facility. Validation experiments are specifically designed for direct comparison with the computational predictions. Making meaningful comparisons between the computational and experimental results requires careful characterization and control of the experimental features or parameters used as inputs into the computational model. Validation experiments must be designed to capture the essential physical phenomena, including all relevant initial and boundary conditions. A significant question of interest to modeling heat flux incident to an object in or near a fire is the contribution of the radiation and convection modes of heat transfer. The series of experiments documented in this test plan is designed to provide data on the radiation partitioning, defined as the fraction of the total heat flux that is due to radiation.

NTIS

Fires; Heat Flux; Radiant Heating; Radiative Heat Transfer; Turbulence

20070005098 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA
New High Capacity Getter for Vacuum Insulated Mobile Liquid Hydrogen Storage Systems
Londer, H.; Myneni, G. R.; Adderley, P.; Bartlok, G.; Setina, J.; January 2005; 16 pp.; In English
Report No.(s): DE2006-886686; No Copyright; Avail.: Department of Energy Information Bridge

Current Non evaporable getters (NEGs), based on the principle of metallic surface sorption of gas molecules, are important tools for the improving the performance of many vacuum systems. High porosity alloys or powder mixtures of Zr, Ti, Al, V, Fe and other metals are the base materials for this type of getters. The continuous development of vacuum technologies has created new challenges for the field of getter materials. The main sorption parameters of the current NEGs, namely, pumping speed and sorption capacity, have reached certain upper limits. Chemically active metals are the basis of a new generation of NEGs. The introduction of these new materials with high sorption capacity at room temperature is a long-awaited development. These new materials enable the new generation of NEGs to reach faster pumping speeds, significantly higher sticking rates and sorption capacities up to 104 times higher during their lifetimes. Our development efforts focus on producing these chemically active metals with controlled insulation or protection. The main structural forms of our new getter materials are spherical powders, granules and porous multi-layers. The full pumping performance can take place at room temperature with activation temperatures ranging from room temperature to 650C. In one of our first pilot projects, our proprietary getter solution was successfully introduced as a getter pump in a double-wall mobile LH2 tank system. Our getters were shown to have very high sorption capacity of all relevant residual gases, including H2. This new concept opens the opportunity for significant vacuum improvements, especially in the field of H2 pumping which is an important task in many different vacuum applications.
NTIS
Getters; High Vacuum; Liquid Hydrogen; Storage Tanks

20070005139 NASA Langley Research Center, Hampton, VA, USA
Probabilistic Thermal Analysis During Mars Reconnaissance Orbiter Aerobraking
Dec, John A.; [2007]; 11 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA; Original contains color illustrations
Report No.(s): AIAA Paper 2007-1214; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005139; Avail.: CASI: A03, Hardcopy

A method for performing a probabilistic thermal analysis during aerobraking has been developed. The analysis is performed on the Mars Reconnaissance Orbiter solar array during aerobraking. The methodology makes use of a response surface model derived from a more complex finite element thermal model of the solar array. The response surface is a quadratic equation which calculates the peak temperature for a given orbit drag pass at a specific location on the solar panel. Five different response surface equations are used, one of which predicts the overall maximum solar panel temperature, and the remaining four predict the temperatures of the solar panel thermal sensors. The variables used to define the response surface can be characterized as either environmental, material property, or modeling variables. Response surface variables are statistically varied in a Monte Carlo simulation. The Monte Carlo simulation produces mean temperatures and 3 sigma bounds as well as the probability of exceeding the designated flight allowable temperature for a given orbit. Response surface temperature predictions are compared with the Mars Reconnaissance Orbiter flight temperature data.
Author
Thermal Analysis; Aerobraking; Probability Theory; Mars Reconnaissance Orbiter; Solar Arrays

20070005147 NASA Langley Research Center, Hampton, VA, USA
Development of Supersonic Combustion Experiments for CFD Modeling
Baurle, Robert; Bivolaru, Daniel; Tedder, Sarah; Danehy, Paul M.; Cutler, Andrew D.; Magnotti, Gaetano; [2007]; 13 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): NNL06AA16A; WBS 599489.02.07.07
Report No.(s): AIAA Paper 2007-0978; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005147; Avail.: CASI: A03, Hardcopy

This paper describes the development of an experiment to acquire data for developing and validating computational fluid dynamics (CFD) models for turbulence in supersonic combusting flows. The intent is that the flow field would be simple yet relevant to flows within hypersonic air-breathing engine combustors undergoing testing in vitiated-air ground-testing facilities. Specifically, it describes development of laboratory-scale hardware to produce a supersonic combusting coaxial jet, discusses design calculations, operability and types of flames observed. These flames are studied using the dual-pump coherent anti-

Stokes Raman spectroscopy (CARS) - interferometric Rayleigh scattering (IRS) technique. This technique simultaneously and instantaneously measures temperature, composition, and velocity in the flow, from which many of the important turbulence statistics can be found. Some preliminary CARS data are presented.
Author
Computational Fluid Dynamics; Supersonic Combustion; Supersonic Jet Flow; Hypersonics; Air Breathing Engines; Flames

20070005218 Connecticut Univ., Storrs, CT USA
Unsteady Storm Drainage Modeling Within the U.S. Army Corps of Engineers GSSHA Model
Ogden, Fred L; Jan 2004; 95 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAAD19-03-1-0355
Report No.(s): AD-A459712; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459712; Avail.: CASI: A05, Hardcopy

The ability to specifically simulate unsteady hydraulics in subsurface storm and tile drains was included in the formulation of the Gridded Surface Subsurface Hydrologic Analysis (GSSHA) model. Simulations were performed to determine model sensitivity to parameters, and the hydrologic significance of subsurface drains.
DTIC
Drainage; Engineers; Hydraulics; Sewers; Storms; Surface Water

20070005236 Scripps Institution of Oceanography, La Jolla, CA USA
Analysis and Modeling of Surfzone Turbulence and Bubbles
Feddersen, Falk; Nov 29, 2006; 6 pp.; In English
Contract(s)/Grant(s): N00014-04-1-0218
Report No.(s): AD-A459822; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459822; Avail.: CASI: A02, Hardcopy

Turbulence in the surfzone and nearshore mixes momentum vertically, transmits stress to the sea bed, influences the structure of the cross- and alongshore currents, and controls the suspension of sediment from the sea bed. In many coastal and shelf environments, the sea-bed is the primary source of turbulence due to bottom induced shear. In the surfzone, the breaking-wave generated turbulence likely dominates over bottom generated turbulence. However, the dynamics of turbulence in the nearshore and surfzone under breaking waves is poorly understood. Realistic three-dimensional simulations of surfzone hydrodynamics and sediment transport, which are currently being attempted, for example, in the recent nearshore NOPP project, will not be possible without at least a rudimentary understanding of nearshore turbulence dynamics. Long term goals include addressing some of the unresolved science issues through analysis and modeling of existing field measurements to quantify turbulence dynamics.
DTIC
Bubbles; Models; Turbulence

20070005334 Massachusetts Inst. of Tech., Cambridge, MA USA
Efficient Multiscale Regularization with Applications to the Computation of Optical Flow
Luettgen, Mark R; Karl, W C; Willsky, Alan S; Apr 1993; 54 pp.; In English
Contract(s)/Grant(s): AFOSR-92-J-0002
Report No.(s): AD-A459986; MIT-LIDS-P-2175; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459986; Avail.: CASI: A04, Hardcopy

A new approach to regularization methods for image processing is introduced and developed using as a vehicle the problem of computing dense optical flow fields in an image sequence. Standard formulations of this problem require the computationally intensive solution of an elliptic partial differential equation which arises from the often used ‘smoothness constraint’ type regularization. We utilize the interpretation of the smoothness constraint as a ‘fractal prior’ to motivate regularization based on a recently introduced class of multiscale stochastic models. The solution of the new problem formulation is computed with an efficient multiscale algorithm.
DTIC
Flow Distribution; Images

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*.

20070003517 University of Southern California, Marina del Rey, CA USA

Acquisition of Time-Varying Participating Media

Hawkins, Tim; Einarsson, Per; Debevec, Paul; Jan 2005; 5 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459153; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459153; Avail.: CASI: A01, Hardcopy

We present a technique for capturing time-varying volumetric data of participating media. A laser sheet is swept repeatedly through the volume, and the scattered light is imaged using a high-speed camera. Each sweep of the laser provides a near-simultaneous volume of density values. We demonstrate rendered animations under changing viewpoint and illumination, making use of measured values for the scattering phase function and albedo.

DTIC

Computer Graphics; Fluid Flow; Time; Variations

20070003691 Massachusetts Inst. of Tech., Cambridge, MA USA

Face Detection in Still Gray Images

May 2000; 28 pp.; In English

Contract(s)/Grant(s): N00014-93-1-3085; N00014-95-1-0600

Report No.(s): AD-A459705; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Image Processing; Image Analysis; Image Reconstruction; Face (Anatomy)

20070003701 Army Tank-Automotive and Armaments Command, Warren, MI USA

A Support Vector Machine Application on Vehicles

Del Rose, Michael; Reed, Jack; Jul 2001; 7 pp.; In English

Report No.(s): AD-A459231; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459231; Avail.: CASI: A02, Hardcopy

In this paper, methods of choosing a vehicle out of an image are explored. Digital images are taken from a monocular camera. Image processing techniques are applied to each single frame picture to create the feature vector. Finally the resulting features are used to classify whether there is a car in the picture or not using support vector machines. The result are compared to those obtained using a neural network. A discussion on techniques to enhance the feature vector and the results from both learning machines will be included.

DTIC

Image Processing; Vehicles

20070003845 Massachusetts Inst. of Tech., Cambridge, MA USA

On the Distributions of Optimized Multiscale Representations

Krim, Hamid; Dec 1996; 6 pp.; In English

Contract(s)/Grant(s): DAAL03-92-G-115; F49620-95-1-0083

Report No.(s): AD-A458890; LIDS-P-2376; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA458890; Avail.: CASI: A02, Hardcopy

Adapted wavelet analysis of signals is achieved by optimizing a selected criterion. We recently introduced a majorization framework for constructing selection functionals, which can be as well suited to compression as entropy or others. We show how these functionals operate on the basis selection and their effect on the statistics of the resulting representation.

DTIC

Signal Processing; Optimization

20070004662 Army Tank-Automotive and Armaments Command, Warren, MI USA
Target/Background Polarization Profiles Using a COTS Digital Camera
Aug 15, 2000; 13 pp.; In English
Report No.(s): AD-A459795; TACOM-16232; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Digital Cameras; Targets; Optical Polarization; Image Analysis; Image Enhancement

20070004733 Army Research Lab., Aberdeen Proving Ground, MD USA
Test Report on the November 2005 NATO RTG-40 Active Imager Land Field Trials
Dec 2006; 74 pp.; In English
Report No.(s): AD-A459787; ARL-TR-4010; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available

North Atlantic Treaty Organization (NATO); Imaging Techniques; Thermoelectric Generators; Radioisotope Batteries

20070005202 Naval Research Lab., Washington, DC USA
A Deception Repeater for Conical-Scan Automatic Tracking Radars
Brandenburg, R L; Sep 27, 1956; 31 pp.; In English
Report No.(s): AD-A459647; NRL-4811; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459647; Avail.: CASI: A03, Hardcopy

No abstract available

Automatic Control; Conical Scanning; Deception; Radar Tracking; Repeaters; Tracking (Position)

20070005203 Naval Research Lab., Washington, DC USA
A HF Pulsed Transmitter for an Experimental Cross-Correlation Radar System
Boyd, F E; Cumings, R G; Nov 1, 1956; 25 pp.; In English
Report No.(s): AD-A459648; NRL-4848; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459648; Avail.: CASI: A03, Hardcopy

No abstract available

Cross Correlation; Radar Transmitters; Transmitters

20070005205 Naval Research Lab., Washington, DC USA
A Wide-Band Video Noise Source, 50 KC to 10 MC
Griffin, Fred T; Apr 2, 1957; 13 pp.; In English
Report No.(s): AD-A459651; NRL-4889; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459651; Avail.: CASI: A03, Hardcopy

No abstract available

Broadband; Noise Generators; Radar Transmitters; Video Signals

20070005317 California Inst. of Tech., Pasadena, CA USA
Voltage-Controlled Tunable GaAs/AlGaAs Multistack Quantum Well Infrared Detector
Grave, I; Shakouri, A; Kuze, N; Yariv, A; May 11, 1992; 4 pp.; In English
Report No.(s): AD-A459962; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459962; Avail.: CASI: A01, Hardcopy

We describe a new type of intersubband GaAs/AlGaAs infrared detector consisting of three stacks of quantum wells; the quantum wells in a given stack-are identical, but are different from stack to stack. Each stack is designed to yield an absorption and a photoresponse at a different peak wavelength. The resulting device is an infrared detector which can operate in a number of modes. Among the features of this device are a wide-band detection domain, a tunable response and excellent responsivities and noise figures. The tunable operation includes a sharp peak-switching response which follows the formation, expansion, and readjustment of electric field domains within the multiquantum well region.
DTIC

Aluminum Gallium Arsenides; Electric Potential; Gallium Arsenides; Infrared Detectors; Quantum Wells; Semiconductors (Materials)

20070005342 California Inst. of Tech., Pasadena, CA USA

Quantum Interference Effect and Electric Field Domain Formation in Quantum Well Infrared Photodetectors

Xu, Yuanjian; Shakouri, Ali; Yariv, Amnon; Jun 1995; 4 pp.; In English

Report No.(s): AD-A459998; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459998; Avail.: CASI: A01, Hardcopy

An observation of quantum interference effect in photocurrent spectra of a weakly coupled bound-to-continuum multiple quantum well photodetector is reported. This effect persists even at high biases where the Kronig Penney minibands of periodic superlattice potential in the continuum are destroyed. Our results show that electrons remain coherent over a distance of 40 50 nm. The observation was used to investigate electric field domain formation induced by sequential resonant tunneling in the superlattice. A large off-resonant energy level alignment between two neighboring wells in the high field domain was observed.

DTIC

Electric Fields; Infrared Radiation; Photometers; Quantum Wells

20070005372 Army Chemical Research and Development Center, Aberdeen Proving Ground, MD USA

Chemical Vapor Detection with a Multispectral Thermal Imager

Althouse, Mark L G; Chang, Chein-I; Nov 1991; 10 pp.; In English

Report No.(s): AD-A460011; No Copyright; Avail.: CASI: A02, Hardcopy

Detection of chemical vapors with a remote sensor is necessary for both military defense and civilian pollution control. The thermal imager is a natural instrument from which to build a chemical sensor since most chemical vapors of interest are spectrally active in its operating wavelength range. A system has been designed to place a chemical detection capability as an adjunct function in a military thermal imager. An additional detector array, which is spectrally filtered at the focal plane, is added to the imager. Real-time autonomous detection and alarm is also required. A detection system model by Warren, based on a Gaussian vapor concentration distribution is the basis for detection algorithms. Algorithms recursive in both time and spectral frequency have been derived using Kalman filter theory. Adaptive filtering is used for preprocessing clutter rejection. Various components of the detection system have been tested individually and an integrated system is now being fabricated.

DTIC

Thermal Mapping; Vapors

20070005431 North Carolina State Univ., Raleigh, NC USA

Multiscale Signal Processing and Shape Analysis for an Inverse Sar Imaging System

He, Yun; Jun 2001; 176 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460126; No Copyright; Avail.: CASI: A09, Hardcopy

The great challenge in signal processing is to devise computationally efficient and statistically optimal algorithms for estimating signals from noisy background and understanding their contents. This thesis treats the problem of multiscale signal processing and shape analysis for an Inverse Synthetic Aperture Radar (ISAR) imaging system. To address some of the limitations of conventional techniques in radar image processing, an information theoretic approach for target motion estimation is first proposed. A wavelet based multiscale method for shape enhancement is subsequently derived and followed by a regression technique for shape recognition.

DTIC

Imaging Techniques; Shapes; Signal Processing; Synthetic Aperture Radar

20070005435 Army Tank-Automotive and Armaments Command, Warren, MI USA

A Comparison of the Detection Rates for Infrared and Visual Imagery of a Person Holdina an RPG

Sohn, Euijung; Meitzler, Tom; Bryk, Darryl; Jozwiak, Rachel; Bednarz, David; Lane, Kim; Bankowski, Elena; Vala, John; Mar 29, 2004; 10 pp.; In English

Report No.(s): AD-A460141; TACOM-16126; No Copyright; Avail.: CASI: A02, Hardcopy

Detection of potential threats that are camouflaged or concealed is important not only for military acquisition problems but, also for crowd surveillance as well as tactical use such as on border patrols. Imaging and display technologies that take advantage of photo-simulation and sensor fusion are discussed in this paper. A comparison of the detection rates of visible, infrared (IR) and sensor-fused imagery of scenes that contain a Rocket Propelled Grenade (RPG) were made. Image fusion

was achieved using a Gaussian Laplacian pyramidal approach with wavelets for edge enhancement. Three types of images were also compared in terms of better detection of concealed weapons.
DTIC
Images; Infrared Detectors; Infrared Imagery

20070005470 Army Tank-Automotive and Armaments Command, Warren, MI USA
Live Modeling of a Dyna Vision SPR-02 Sensor for Rangefinding Application
DiCesare, Deborah; Fredrick, David; Modi, Mitul; Smith, Timothy; Aug 18, 1998; 8 pp.; In English
Report No.(s): AD-A460199; TACOM-16208; No Copyright; Avail.: CASI: A02, Hardcopy

Terrain sensing in high clutter environments commonly encountered in battlefield operations continues to be an operational concern. Clutter, such as battlefield debris, dust, smoke, and obscurants make the use of non-touch terrain sensing solutions difficult. In the first step to obtaining a non-touch sensor solution, live modeling of a DynaVision SPR-02 Intelligent Single Point Sensor will be conducted. This sensor is a laser source non-contact optical displacement measurement system. Scanning is accomplished by projecting a continuous light beam onto a surface and detecting the wave image of this beam on a Charge Coupled Device (CCD) array.
DTIC
Optical Measuring Instruments; Rangefinding

20070005509 Georgetown Univ., Washington, DC USA
Workshop for Open Source Universal Picture Archiving and Communication Systems (PACS)
Tohme, Walid G; Dec 2006; 79 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-05-2-0073
Report No.(s): AD-A460346; No Copyright; Avail.: CASI: A05, Hardcopy

MHS has fully embraced digital imaging technologies. PACS allow for the archiving and management of these images across different MTFs. It has become increasingly difficult to cope with image management requirements and challenges associated with managing network security. Two workshops were organized around each of these topics with the intent of defining the issues and determining potential solutions. The ‘Open Source Universal PACS Archive’ workshop focused on current challenges of and open source solutions to the management of images and other clinical information in multi-center settings. The ‘Network Security for Medical Devices and Systems’ workshop assessed emergent issues and operational impacts related to the imposition of non-medical Information Assurance and network security processes to the healthcare delivery domain. The following three recommendations are the output of the conference: (1) establish a medical Community of Interest (COI), (2) protect the medical COI; and (3) establish guidance for the medical device industry.
DTIC
Documents; Images; Telecommunication

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*.

20070003679 NASA Ames Research Center, Moffett Field, CA, USA
Zeeman Tuning Rates in the v3 Band of NO2
Mahon, C. H.; Chackerian, C.; Giver, L. P.; [1997]; 1 pp.; In English; 52nd Ohio State University International Symposium on Molecular Spectroscopy, 16-20 Jun. 1997, Columbia, OH, USA
Contract(s)/Grant(s): RTOP 622-67-67-10; No Copyright; Avail.: Other Sources; Abstract Only

Zeeman spectra of the v3 fundamental (at approximately 1620 c/m) of nitrogen dioxide (14N02) have been recorded with magnetic fields of approximately 500 Gauss using a FTS (at the Kitt Peak National Observatory), as well as a tunable diode laser. At low magnetic fields the Zeeman effect is small compared to the spin-rotation interaction, and the Zeeman tuning rates are expected to be linear with magnetic field. Measured tuning rates of the Q-branch (KA = 2 - 9, N = 2 - 6) sigma transitions are compared to those expected for 2Sigma transitions in low magnetic fields, 2mu ogB/(2N+l). These measurements are

required in the data analysis of an ultra-sensitive (pptv) in situ detector based on magnetic-rotation spectroscopy.
Author
Nitrogen Dioxide; Spectral Bands; Tuning; Zeeman Effect

20070003696 Naval Research Lab., Washington, DC USA
Low-Voltage Infrared Free-Electron Lasers Based on Gyrotron-Powered RF Wigglers
Nov 15, 1996; 17 pp.; In English
Report No.(s): AD-A459614; NRL/FR/6790--96-9834; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Free Electron Lasers; Infrared Lasers; Low Voltage; Radio Frequencies; Wiggler Magnets; Cyclotron Resonance Devices

20070003718 University of Central Florida, Orlando, FL USA
Semiconductor 1.7 W Volume Bragg Laser with Divergence Close to a Diffraction Limit
Jan 2004; 3 pp.; In English
Contract(s)/Grant(s): HR-01-1041-0004
Report No.(s): AD-A459606; No Copyright; Avail.: CASI: A01, Hardcopy

No abstract available

Diffraction; Divergence; Lasers; Semiconductors (Materials)

20070005318 Naval Research Lab., Washington, DC USA
Dispersion Management in a Harmonically Mode-Locked Fiber Soliton Laser
Carruthers, Thomas F; Duling, III, Irl N; Horowitz, Moshe; Menyuk, Curtis R; Oct 31, 1999; 4 pp.; In English
Report No.(s): AD-A459963; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459963; Avail.: CASI: A01, Hardcopy

Harmonically mode-locked Er-fiber soliton lasers have become a reliable source of high-repetition-rate picosecond pulses in high-speed communications and photonic analog-to-digital conversion systems because of their low-noise, dropout-free operation. We have fabricated such a laser with a strongly dispersion-managed cavity and modeled its operation, and we have found that dispersion management significantly extends the power range over which uninterrupted single-pulse production is attained and dramatically decreases the effects of amplified spontaneous emission on the phase noise of the laser.

DTIC
Analog to Digital Converters; Fiber Lasers; Laser Mode Locking; Lasers

20070005323 California Inst. of Tech., Pasadena, CA USA
Performance Improvement in Quantum Well Lasers by Optimizing Band Gap Offset at Quantum Well Heterojunctions
Zhao, B; Chen, T R; Shakouri, A; Yariv, A; Jul 26, 1993; 4 pp.; In English
Report No.(s): AD-A459969; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459969; Avail.: CASI: A01, Hardcopy

We analyze the influence of the band gap offset at the quantum well (QW) heterojunctions on the performance of QW lasers. It is shown that, in addition to the strain, optimization of the band gap offset also leads to improved performance in QW lasers, especially in enabling a simultaneous attainment of ultralow threshold current and high speed. The improvement stems from the reduction of state filling in the QW lasers since the asymmetry between the conduction band and the valence band structures in the optical confining region is compensated by the corresponding optimal band gap offset at the QW heterojunctions. The results provide general guidelines to the design of high performance of QW lasers as well as suggest applications to other active laser devices.

DTIC
Energy Gaps (Solid State); Heterojunctions; Quantum Well Lasers; Quantum Wells

20070005344 California Inst. of Tech., Pasadena, CA USA
Sub-100 muA Current Operation of Strained InGaAs Quantum Well Lasers at Low TemperaturesL
Zhao, B; Chen, T R; Eng, L E; Zhuang, Y H; Shakouri, A; Yariv, A; Oct 3, 1994; 4 pp.; In English
Report No.(s): AD-A460002; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460002; Avail.: CASI: A01, Hardcopy

Very low threshold currents (\h100 muA) have been achieved in InGaAs strained single quantum well lasers at cryogenic temperatures. Threshold currents of 38 and 56 muA and external quantum efficiency ~ 1 mW/mA have been demonstrated under cw operation condition at temperatures of 6 and 77 K, respectively. The external quantum efficiency increased by about a factor of 2 at low temperatures (\h100 K) in comparison to that at room temperature. These results are relevant to the prospect of integration of semiconductor lasers with low temperature electronics for high performance

DTIC

Indium Gallium Arsenides; Quantum Well Lasers

20070005409 Missouri Univ., Rolla, MO USA

A Multi-Scale Modeling of Laser Cladding Process (Preprint)

Cao, J; Choi, J; Apr 2006; 42 pp.; In English

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

Report No.(s): AD-A460099; No Copyright; Avail.: CASI: A03, Hardcopy

Laser cladding is an additive manufacturing process that a laser generates a melt-pool on the substrate material while a second material, as a powder or a wire form, is injected into that melt-pool. Among all laser manufacture processes, laser cladding offers the most extensive variety of possibilities to alter a component at its surface. Despite immense potentials and advancements, the process model of microstructure evolution and its coupling with macro parameter of laser cladding process has not been fully developed. To address this issue, a process model of microstructure evolution has been studied by utilizing a phase-field method. Phase-field method has become a widely used computation tool for the modeling of microstructure evolution with the advantage of avoiding of tracking the interface explicitly and satisfying interfacial boundary conditions. In present work, the numerical solutions of a phase-field model are analyzed. The connection of macro-process and microstructure evolution is examined by considering the relationship of macro- and micro- parameters. The effects of thermal noise and melt undercooling on the final microstructure have also been studied. The prediction results are compared with other researchers' results and good agreement was found. Different solidification morphologies of different locations in the melt pool are also investigated. It was found that not the mass transfer but the heat transfer in the melt pool dominates the solidification process.

DTIC

Cladding; Laser Applications; 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*.

20070003565 NASA Ames Research Center, Moffett Field, CA, USA

Intelligent Weather Agent

Spirkovska, Liljana, Inventor; October 31, 2006; 24 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 26 FEb. 2004; US-Patent-7,129,857; US-Patent-Appl-SN-789049; NASA-Case-ARC-12970-1; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003565; Avail.: CASI: A03, Hardcopy

Method and system for automatically displaying, visually and/or audibly and/or by an audible alarm signal, relevant weather data for an identified aircraft pilot, when each of a selected subset of measured or estimated aviation situation parameters, corresponding to a given aviation situation, has a value lying in a selected range. Each range for a particular pilot may be a default range, may be entered by the pilot and/or may be automatically determined from experience and may be subsequently edited by the pilot to change a range and to add or delete parameters describing a situation for which a display should be provided. The pilot can also verbally activate an audible display or visual display of selected information by verbal entry of a first command or a second command, respectively, that specifies the information required.

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

Weather; Automatic Control; Systems Engineering; Display Devices

20070003581 NASA Ames Research Center, Moffett Field, CA, USA

Powder Handling Device for Analytical Instruments

Sarrazin, Philippe C., Inventor; Blake, David F., Inventor; September 26, 2006; 18 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 17 Mar. 2004; US-Patent-7,113,265; US-Patent-Appl-SN-808704; NASA-Case-ARC-15101-1; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003581; Avail.: CASI: A03, Hardcopy

Method and system for causing a powder sample in a sample holder to undergo at least one of three motions (vibration, rotation and translation) at a selected motion frequency in order to present several views of an individual grain of the sample. One or more measurements of diffraction, fluorescence, spectroscopic interaction, transmission, absorption and/or reflection can be made on the sample, using light in a selected wavelength region.

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

Powder (Particles); Holders; Mechanical Devices; Measuring Instruments

20070003737 National Renewable Energy Lab., Golden, CO USA

Case Study: Ebus Hybrid Electric Buses and Trolleys

Barnitt, R.; Jul. 2006; 50 pp.; In English

Report No.(s): DE2006-888678; NREL/TP-540-38749; No Copyright; Avail.: National Technical Information Service (NTIS)

The U.S. Department of Energy's (DOE) Advanced Vehicle Testing Activity (AVTA) provides unbiased evaluations on alternative fuel and advanced transportation technologies that reduce U.S. dependence on foreign oil while improving the nation's air quality. AVTA's role is to bridge the gap between research and development (R&D) and the commercial availability of alternative fuels and advanced vehicle technologies. AVTA supports DOE's FreedomCAR & Vehicle Technologies Program by examining market factors and customer requirements, evaluating the performance and durability of alternative fuel and advanced technology vehicles, and assessing the performance of these vehicles in fleet applications.

NTIS

Electric Motor Vehicles; Transportation

20070004671 Army Research Lab., Aberdeen Proving Ground, MD USA

Procedure for Near-Simultaneous Testing

Dec 2006; 28 pp.; In English

Contract(s)/Grant(s): Proj-622618H8099

Report No.(s): AD-A459761; ARL-TN-266; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Impact; Projectiles; Impact Tests

20070004705 Army Tank-Automotive Research and Development Command, Warren, MI USA

Using Motion-Base Simulation to Guide Future Force Systems Design

Feb 2, 2006; 9 pp.; In English

Report No.(s): AD-A459735; 15506; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Motion Simulation; Systems Engineering; Loads (Forces)

20070004909 NASA Glenn Research Center, Cleveland, OH, USA

Application of Carbon Based Nano-Materials to Aeronautics and Space Lubrication

Street, Kenneth W., Jr.; Miyoshi, Kazuhisa; Wal, Randy L. Vander; January 2007; 33 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): WBS 984754.01.03

Report No.(s): NASA/TM-2007-214473; E-15765; Copyright; Avail.: CASI: A03, Hardcopy

The tribology program at NASA Glenn Research Center in Cleveland, Ohio, is investigating carbon based nano-particles for their potential in advanced concept lubrication products. Service conditions range from high temperature atmospheric to low temperature vacuum. Some of the lubricants and surface coatings of tribological significance that we have evaluated include neat nano-particles, both grown in-situ and as bulk material deposited on the substrate, and nano-particles dispersed in oils which are all highly substrate interactive. We discuss results of testing these systems in a spiral orbit tribometer (SOT) and a unidirectional pin-on-disc (PoD) tribometer. A nano-onions/Krytox mixture evaluated as a lubricant for angular contact bearings in air caused a marked lowering of the coefficient of friction (CoF) (0.04 to 0.05) for the mixture with an eight-fold improvement in lifetime over that of the Krytox alone. In vacuum, no effect was observed from the nano-onions. Multi-walled nanotubes (MWNT) and graphitized MWNT were tested under sliding friction in both air and vacuum. The MWNT which

were grown in-situ oriented normal to the sliding surface exhibited low CoF (0.04) and long wear lives. Bulk MWNT also generate low CoF (0.01 to 0.04, vacuum; and 0.06, air) and long wear life (\g1 million orbits, vacuum; and \g3.5 million, air). Dispersed graphitized MWNT were superior to MWNT and both were superior to aligned MWNT indicating that orientation is not an issue for solid lubrication. Single-walled nanotubes (SWNT) were modified by cutting into shorter segments and by fluorination. All SWNTs exhibited low CoF in air, with good wear lives. The SWNT with slight fluorination yielded an ultra-low CoF of 0.002 although the best wear life was attributed to the nascent SWNT.
Author
Tribology; Lubricants; Carbon; Nanotubes; High Temperature; Graphitization; Lubrication; Sliding Friction

20070004965 Liell and McNeil Attorneys, P.C., Bloomington, IN, USA
Mixed Mode Fuel Injector and Injection System
Stewart, C. L.; Tian, Y.; Wang, L.; Shafer, S. F.; 23 Jun 03; 16 pp.; In English
Contract(s)/Grant(s): DE-FC05-970R22605
Patent Info.: Filed Filed 23 Jun 03; US-Patent-Appl-SN-10-601 451
Report No.(s): PB2007-100883; No Copyright; Avail.: CASI: A03, Hardcopy

A fuel injector includes a homogenous charge nozzle outlet set and a conventional nozzle outlet set that are controlled respectively by first and second three way needle control valves. Each fuel injector includes first and second concentric needle valve members. One of the needle valve members moves to an open position for a homogenous charge injection event, while the other needle valve member moves to an open position for a conventional injection event. The fuel injector has the ability to operate in a homogenous charge mode with a homogenous charge spray pattern, a conventional mode with a conventional spray pattern or a mixed mode.
NTIS
Fuel Injection; Injection; Patent Applications

20070004992 Kansas State Univ., Manhattan, KS, USA
Cost-Effective Reciprocating Engine Emissions Control and Monitoring for E&P Field and Gatherings Engines. Report 14. Technical Report, April 1, 2006-June 30, 2006
Chapman, K. S.; Nuss-Warren, S. R.; Jul. 2006; 13 pp.; In English
Report No.(s): DE2006-889641; No Copyright; Avail.: Department of Energy Information Bridge

Continuing work in controlled testing uses a one cylinder Ajax DP-115 (a 13.25 in bore OE 16 in stroke, 360 rpm engine) to assess a sequential analysis and evaluation of a series of engine upgrades. As with most of the engines used in the natural gas industry, the Ajax engine is a mature engine with widespread usage throughout the gas gathering industry. The end point is an assessment of these technologies that assigns a cost per unit reduction in NOX emissions. Technologies including one pre-combustion chamber, in-cylinder sensors, the means to adjust the air-to-fuel ratio, and modification of the air filter housing have been evaluated in previous reports. Current work focuses on final preparations for testing pre-combustion chambers with different characteristics and using mid-to-high-pressure fuel valves and initial runs of these tests. By using the Ajax DP-115 these tests are completed in a low-cost and efficient manner. The various technologies can be quickly exchanged with different hardware, and it is inexpensive to run the engine. Progress in moving toward field testing is discussed, and changes to the first planned field test are presented. Although changes have been made to the previous plan, it is expected that several new sites will be selected soon.
NTIS
Combustion Products; Cost Effectiveness; Costs; Exhaust Emission; Exhaust Gases; Internal Combustion Engines; Natural Gas; Piston Engines

20070005014 NASA Glenn Research Center, Cleveland, OH, USA
Post Irradiation Evaluation of Thermal Control Coatings and Solid Lubricants to Support Fission Surface Power Systems
Bowman, Cheryl L.; Jaworske, Donald A.; Stanford, Malcolm K.; Persinger, Justin A.; Khorsandi, Behrooz; Blue, Thomas E.; [2007]; 8 pp.; In English; Space Technology Applications International Forum, 11-15 Feb. 2007, Albuquerque, Mexico; Original contains color illustrations
Contract(s)/Grant(s): WBS 453189.04.03; Copyright; Avail.: CASI: A02, Hardcopy

The development of a nuclear power system for space missions, such as the Jupiter Icy Moons Orbiter or a lunar outpost, requires substantially more compact reactor design than conventional terrestrial systems. In order to minimize shielding

requirements and hence system weight, the radiation tolerance of component materials within the power conversion and heat rejection systems must be defined. Two classes of coatings, thermal control paints and solid lubricants, were identified as material systems for which limited radiation hardness information was available. Screening studies were designed to explore candidate coatings under a predominately fast neutron spectrum. The Ohio State Research Reactor Facility staff performed irradiation in a well characterized, mixed energy spectrum and performed post irradiation analysis of representative coatings for thermal control and solid lubricant applications. Thermal control paints were evaluated for 1 MeV equivalent fluences from 10(exp 13) to 10(exp 15) n per square centimeters. No optical degradation was noted although some adhesive degradation was found at higher fluence levels. Solid lubricant coatings were evaluated for 1 MeV equivalent fluences from 10(exp 15) to 10(exp 16) n per square centimeters with coating adhesion and flexibility used for post irradiation evaluation screening. The exposures studied did not lead to obvious property degradation indicating the coatings would have survived the radiation environment for the previously proposed Jupiter mission. The results are also applicable to space power development programs such as fission surface power for future lunar and Mars missions.
Author
Fission; Irradiation; Solid Lubricants; Thermal Control Coatings; Nuclear Power Reactors

20070005016 NASA Glenn Research Center, Cleveland, OH, USA
Turbomachinery Clearance Control
Chupp, Raymond E.; Hendricks, Robert C.; Lattime, Scott B.; Steinetz, Bruce M.; Aksit, Mahmut F.; [2007]; 135 pp.; In English; Copyright; Avail.: CASI: A07, Hardcopy

Controlling interface clearances is the most cost effective method of enhancing turbomachinery performance. Seals control turbomachinery leakages, coolant flows and contribute to overall system rotordynamic stability. In many instances, sealing interfaces and coatings are sacrificial, like lubricants, giving up their integrity for the benefit of the component. They are subjected to abrasion, erosion, oxidation, incursive rubs, foreign object damage (FOD) and deposits as well as extremes in thermal, mechanical, aerodynamic and impact loadings. Tribological pairing of materials control how well and how long these interfaces will be effective in controlling flow. A variety of seal types and materials are required to satisfy turbomachinery sealing demands. These seals must be properly designed to maintain the interface clearances. In some cases, this will mean machining adjacent surfaces, yet in many other applications, coatings are employed for optimum performance. Many seals are coating composites fabricated on superstructures or substrates that are coated with sacrificial materials which can be refurbished either in situ or by removal, stripping, recoating and replacing until substrate life is exceeded. For blade and knife tip sealing an important class of materials known as abradables permit blade or knife rubbing without significant damage or wear to the rotating element while maintaining an effective sealing interface. Most such tip interfaces are passive, yet some, as for the high-pressure turbine (HPT) case or shroud, are actively controlled. This work presents an overview of turbomachinery sealing. Areas covered include: characteristics of gas and steam turbine sealing applications and environments, benefits of sealing, types of standard static and dynamics seals, advanced seal designs, as well as life and limitations issues.
Author
Clearances; Turbomachinery; Control Theory; Tribology; Systems Engineering

38
QUALITY ASSURANCE AND RELIABILITY

Includes approaches to, and methods for reliability analysis and control, quality control, inspection, maintainability, and standardization.

20070004931 NASA Marshall Space Flight Center, Huntsville, AL, USA
Laser Shearography Inspection of TPS (Thermal Protection System) Cork on RSRM (Reusable Solid Rocket Motors)
Lingbloom, Mike; Plaia, Jim; Newman, John; January 2006; 40 pp.; In English; American Society of Non-Desructive Testing, 13-17 Mar. 2006, Orlando, FL, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): NAS8-97238; Copyright; Avail.: CASI: A03, Hardcopy

Laser Shearography is a viable inspection method for detection of de-bonds and voids within the external TPS (thermal protection system) on to the Space Shuttle RSRM (reusable solid rocket motors). Cork samples with thicknesses up to 1 inch were tested at the LTI (Laser Technology Incorporated) laboratory using vacuum-applied stress in a vacuum chamber. The testing proved that the technology could detect cork to steel un-bonds using vacuum stress techniques in the laboratory environment. The next logical step was to inspect the TPS on a RSRM. Although detailed post flight inspection has confirmed that ATK Thiokol's cork bonding technique provides a reliable cork to case bond, due to the Space Shuttle Columbia incident

there is a great interest in verifying bond-lines on the external TPS. This interest provided and opportunity to inspect a RSRM motor with Laser Shearography. This paper will describe the laboratory testing and RSRM testing that has been performed to date. Descriptions of the test equipment setup and techniques for data collection and detailed results will be given. The data from the test show that Laser Shearography is an effective technology and readily adaptable to inspect a RSRM.
Author
Bonded Joints; Shearography; Nondestructive Tests; Cork (Materials)

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*.

20070003749 NASA Langley Research Center, Hampton, VA, USA, General Dynamics Advanced Information Systems, Chantilly, VA, USA
Bearing-Load Modeling and Analysis Study for Mechanically Connected Structures
Knight, Norman F., Jr.; December 2006; 50 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): NNL05AD09D; GS-00F-0067M; WBS 759-07-09
Report No.(s): NASA/CR-2006-214529; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003749; Avail.: CASI: A03, Hardcopy

Bearing-load response for a pin-loaded hole is studied within the context of two-dimensional finite element analyses. Pin-loaded-hole configurations are representative of mechanically connected structures, such as a stiffener fastened to a rib of an isogrid panel, that are idealized as part of a larger structural component. Within this context, the larger structural component may be idealized as a two-dimensional shell finite element model to identify load paths and high stress regions. Finite element modeling and analysis aspects of a pin-loaded hole are considered in the present paper including the use of linear and nonlinear springs to simulate the pin-bearing contact condition. Simulating pin-connected structures within a two-dimensional finite element analysis model using nonlinear spring or gap elements provides an effective way for accurate prediction of the local effective stress state and peak forces.
Author
Mathematical Models; Bearings; Mechanical Properties; Holes (Mechanics); Joints (Junctions); Axial Loads

20070004789 Library of Congress, Washington, DC USA
Border Security: Barriers Along the U.S. International Border
Nunez-Neto, Blas; Vina, Stephen; Oct 30, 2006; 47 pp.; In English
Report No.(s): AD-A459132; CRS-RL33659; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459132; Avail.: CASI: A03, Hardcopy

Congress has been considering expanding the barriers currently deployed along the U.S. international land border. Currently, the USA Border Patrol (USBP) deploys fencing, which aims to impede the illegal entry of individuals, and vehicle barriers, which aim to impede the illegal entry of vehicles (but not individuals) along the border. The USBP first began erecting barriers in 1990 to deter illegal entries and drug smuggling in its San Diego sector. The ensuing 14 mile-long San Diego ‘primary fence’ formed part of the USBP’s ‘Prevention Through Deterrence’ strategy, which called for reducing unauthorized migration by placing agents and resources directly on the border along population centers in order to deter would-be migrants from entering the country. In 1996, Congress passed the Illegal Immigration Reform and Immigrant Responsibility Act which, among other things, explicitly gave the Attorney General (now the Secretary of the Department of Homeland Security) broad authority to construct barriers along the border and authorized the construction of a secondary layer of fencing to buttress the completed 14 mile primary fence. The Secure Fence Act of 2006 directs DHS to construct 850 miles of additional border fencing. While the San Diego fence, combined with an increase in agents and other resources in the USBP’s San Diego sector, has proven effective in reducing the number of apprehensions made in that sector, there is considerable evidence that the flow of illegal immigration has adapted to this enforcement posture and has shifted to the more remote areas of the Arizona desert. A number of policy issues concerning border barriers generally and fencing specifically may be of interest to Congress, including, but not limited, to their effectiveness, costs versus benefits, location, design, environmental impact, potential

diplomatic ramifications, and the costs of acquiring the land needed for construction.
DTIC
Patrols; United States

20070004839 Ghosh (S. K.) Associates, Inc., Northbrook, IL, USA
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of Building Code Structural Requirements. NIST NCSTAR 1-1B
Ghosh, S. K.; Liang, X.; Sep. 2005; 272 pp.; In English
Report No.(s): PB2007-104569; No Copyright; Avail.: CASI: A12, Hardcopy

This report provides a comparison of the structural provisions of: (1) the New York City Building Code, 1968 edition; (2) the New York City Building Code, 2001 edition; (3) the New York State Building Construction Code, 1964 edition; (4) the Municipal Code of Chicago, 1967 edition; and (5) the Building (known as BOCA) Basic Building Code, 1965 edition. Detailed comparisons are provided in a tabular form. The comparisons are summarized in the body of the report.
NTIS
Buildings; Damage; Fire Prevention

20070004840 Ghosh (S. K.) Associates, Inc., Northbrook, IL, USA
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Maintenance and Modifications to Structural Systems. NIST NCSTAR 1-1C. (Appendices not included)
Fanella, D. A.; Derecho, A. T.; Ghosh, S. K.; Sep. 2005; 176 pp.; In English
Report No.(s): PB2007-104570; No Copyright; Avail.: CASI: A09, Hardcopy

This report documents maintenance and modifications that were made to the structural systems of World Trade Center (WTC) 1, 2, and 7. Included are the Port Authority of New York and New Jersey (PANYNJ or Port Authority) guidelines for inspection, repair, and modifications to the structural systems of WTC 1, 2, and 7. Discussed are the guidelines that governed the inspection and strengthening of existing structural members. Also contained in this report is a summary of the structural inspection programs that were undertaken during the occupancy of WTC 1, 2, and 7. Included are the summaries of the facility condition survey reports that were produced for WTC 1, 2, and 7 and descriptions of the structural integrity inspection programs that were undertaken for WTC 1 and WTC 2. The significant modifications and repairs that were made to structural systems of WTC 1, 2, and 7 from initial occupancy to September 11, 2001, are also documented. A discussion on the repairs that were made after the February 1993 bombing of WTC 1 is also included.
NTIS
Buildings; Damage; Fire Prevention; Maintenance

20070004841 Jensen (Rolf) and Associates, Inc., Springfield, VA, USA
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Fire Protection and Life Safety Provisions Applied to the Design and Construction of WTC 1, 2, 7 and Post-Construction Provisions Applied After Occupancy. NIST NCSTAR 1-1D
Grill, R. A.; Johnson, D. A.; Sep. 2005; 202 pp.; In English
Report No.(s): PB2007-104572; No Copyright; Avail.: CASI: A10, Hardcopy

This report was prepared to support the analysis of building and fire codes and standards of the National Institute of Standards and Technology World Trade Center (WTC) Investigation. To best analyze the performance of WTC 1, 2, and 7 in response to the September 11, 2001 attacks, the provisions of the design and construction of the buildings must first be understood. The purpose of this report is to summarize the fire protection (both passive and active) and life safety provisions that were used to design and construct WTC 1, 2, and 7 and to document the changes in building code regulations that occurred after their construction. Determination of the applicable building provisions was a multi-step task. First, documentation (such as drawings, memoranda, and New York City building regulations) was analyzed to identify the initial construction provisions at the times of construction of the three buildings. Second, New York City amended building provisions. Third, the building provisions were analyzed to determine their applicability to the building characteristics of WTC 1, 2, and 7.
NTIS
Buildings; Construction; Damage; Fire Prevention; Safety

20070004842 Port Authority of New York and New Jersey, Jersey City, NJ, USA

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. Appendices A-G

Sep. 2005; 216 pp.; In English

Report No.(s): PB2007-104571; No Copyright; Avail.: CASI: A10, Hardcopy

The collapse of World Trade Center (WTC) 1, 2, and 7 resulted from structural damage from direct and indirect effects of aircraft impact and the ensuing fires. Thus, for collapse analyses of these buildings, knowledge of the physical state of the structural and fire safety systems prior to the aircraft impact is essential. To obtain information for the collapse analysis of the buildings, National Institute of Standards and Technology reviewed design and construction documents, correspondence, and memoranda related to the building projects; interviewed individuals involved in the design, construction, and maintenance of the buildings; obtained information from regulatory and emergency services agencies of New York City; and reviewed books and published journal and magazine articles related to the WTC building projects. Information obtained from various sources are synthesized and summarized in this report. Specifically, this report presents (1) provisions used to design and construct the structural, fire protection and egress systems of the buildings; (2) tests performed to support the design of these systems; (3) criteria that governed the design of the structural and fire protection systems; (4) methods used to proportion structural members and other components of the buildings; (5) innovative features, technologies and materials that are incorporated in design and construction of the structural and fire protection systems; (6) details of deviations to the contract documents granted by Port Authority of New York and New Jersey; (7) fabrication and inspection requirements at the fabrication yard; and (8) inspection protocols during construction.

NTIS

Buildings; Damage; Fire Prevention

20070004843 Jensen (Rolf) and Associates, Inc., Springfield, VA, USA

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of Codes, Standards, and Practices in Use at the Time of the Design and Construction of World Trade Center 1, 2, and 7. NIST NCSTAR 1-1E

Razza, J. C.; Grill, R. A.; Sep. 2005; 100 pp.; In English

Report No.(s): PB2007-104573; No Copyright; Avail.: CASI: A05, Hardcopy

This report was prepared to support the goals and objectives of the analysis of building and fire codes and practices of the National Institute of Standards and Technology World Trade Center (WTC) Investigation. The report provides a comparison and summary of significant differences between the 1968 Building Code of the City of New York (determined to be the current building code at the time of construction of WTC 1 and WTC 2), the provisions of the New York State Building Construction Code, and the City of Chicago Building Code that were available at that time.

NTIS

Buildings; Damage; Fire Prevention; Procedures

20070004845 Jensen (Rolf) and Associates, Inc., Springfield, VA, USA

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of the 1968 and Current (2003) New York City Building Code Provisions. NIST NCSTAR 1-1F

Razza, J. C.; Grill, R. A.; Sep. 2005; 92 pp.; In English

Report No.(s): PB2007-104574; No Copyright; Avail.: CASI: A05, Hardcopy

This report was prepared to support the analysis of building and fire codes and practices of the National Institute of Standards and Technology World Trade Center (WTC) Investigation. The report provides a comparison and summary of significant differences between the 1968 Building Code of the City of New York (determined to be the current building code at the time of construction of WTC 1 and WTC 2) and the provisions of the 2003 (current) edition of the Building Code of the City of New York.

NTIS

Buildings; Damage; Fire Prevention; New York City (NY)

20070004849 National Inst. of Standards and Technology, Gaithersburg, MD USA, Applied Research Associates, Inc., Albuquerque, NM, USA

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Analysis of Aircraft Impacts into the World Trade Center Towers. Appendix A. Still Images of the Video Records Used in Chapter 7

Sep. 2005; 10 pp.; In English

Report No.(s): PB2007-104984; No Copyright; Avail.: CASI: A02, Hardcopy

This appendix provides still images of the video records used to estimate the initial impact conditions of the aircraft that impacted World Trade Center (WTC) 1 and WTC 2 (see Chapter 7). A short description of each of these videos is provided in Table 7-1.

NTIS

Buildings; Damage; Fire Prevention; Towers

20070004852 National Inst. of Standards and Technology, Gaithersburg, MD USA

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: The Emergency Response Operations. Appendices A-L

Sep. 2005; 514 pp.; In English

Report No.(s): PB2007-104983; No Copyright; Avail.: CASI: A22, Hardcopy

The collapse of World Trade Center (WTC) 1, 2, and 7 resulted from structural damage from direct and indirect effects of aircraft impact and the ensuing fires. Thus, for collapse analyses of these buildings, knowledge of the physical state of the structural and fire safety systems prior to the aircraft impact is essential. To obtain information for the collapse analysis of the buildings, National Institute of Standards and Technology reviewed design and construction documents, correspondence, and memoranda related to the building projects; interviewed individuals involved in the design, construction, and maintenance of the buildings; obtained information from regulatory and emergency services agencies of New York City; and reviewed books and published journal and magazine articles related to the WTC building projects. Information obtained from various sources are synthesized and summarized in this report. Specifically, this report presents (1) provisions used to design and construct the structural, fire protection and egress systems of the buildings; (2) tests performed to support the design of these systems; (3) criteria that governed the design of the structural and fire protection systems; (4) methods used to proportion structural members and other components of the buildings; (5) innovative features, technologies and materials that are incorporated in design and construction of the structural and fire protection systems; (6) details of deviations to the contract documents granted by Port Authority of New York and New Jersey; (7) fabrication and inspection requirements at the fabrication yard; and (8) inspection protocols during construction.

NTIS

Buildings; Damage; Emergencies; Fire Prevention

20070004853 NuStats Partners, LP, Austin, TX, USA

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Technical Documentation for Survey Administration. Questionnaires, Interviews, and Focus Groups. NIST NCSTAR 1-7B

Zmud, J.; Sep. 2005; 79 pp.; In English

Report No.(s): PB2007-104982; No Copyright; Avail.: CASI: A05, Hardcopy

This report documents the methods and outcomes of the telephone survey, face-to-face interviews, and focus groups that were conducted in support of the federal building and fire safety investigation of the World Trade Center disaster. In total, 803 telephone interviews were completed, 220 face-to-face interviews were completed, and 6 focus groups involving 28 individuals were completed. All interview material was transferred to National Institute of Standards and Technology investigators for analysis.

NTIS

Buildings; Damage; Fire Prevention; Surveys; Telephones

20070004854 National Inst. of Standards and Technology, Gaithersburg, MD USA, Society of Fire Protection Engineers, Bethesda, MD, USA

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Fires Prior to September 11, 2001. NIST NCSTAR 1-4A

Kuligowski, E. D.; Evans, D. D.; Peacock, R. D.; Sep. 2005; 140 pp.; In English

Report No.(s): PB2007-104580; No Copyright; Avail.: CASI: A07, Hardcopy

Fires occurred in World Trade Center (WTC) 1, 2, and 7 prior to September 11, 2001. This report documents the facts of significant fires in the buildings after first occupancy as they relate to the performance of the automatic sprinkler, manual suppression, fire detection, and smoke purge systems. The ultimate goal of this review was to identify from New York City Fire Department (FDNY) records significant but not well-known fires for further study. From the information contained in FDNY fire reports and fire investigation records provided to the National Institute of Standards and Technology (NIST), 47 fires occurred in WTC 1, 2, and 7 that were of sufficient size and duration. To activate multiple sprinklers or were estimated by NIST to be capable of doing so, over the time period the buildings were occupied. This total does not include the major 1975 office fire in WTC 1 or the 1993 bombing.

NTIS

Buildings; Construction; Damage; Fire Prevention; Fires

20070004855 National Fire Protection Association, Boston, MA, USA, National Research Council of Canada, Ottawa, Ontario, Canada

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Analysis of Published Accounts of the World Trade Center Evacuation. NIST NCSTAR 1-7A

Fahy, R. F.; Proulx, G.; Sep. 2005; 70 pp.; In English

Report No.(s): PB2007-104981; No Copyright; Avail.: CASI: A04, Hardcopy

Published stories of the survivors of the World Trade Center (WTC) attacks were collected to document the event and as background material to guide the development of the National Institute of Standards and Technology (NIST) investigation on occupant behavior during the evacuation of the WTC. These first-person accounts came from newspapers, radio and television programs, e-mail exchanges, and a variety of web sites. The accounts analyzed were from survivors located in several areas in each tower, providing a distribution of floors from the upper, middle, and lower strata of the two towers. In total, 745 accounts were analyzed, representing 435 survivors from WTC 1 and WTC 2.

NTIS

Buildings; Damage; Fire Prevention

20070004856 National Inst. of Standards and Technology, Boulder, CO, USA

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Contemporaneous Structural Steel Specifications. NIST NCSTAR 1-3A

Luecke, W. E.; Siewert, T. A.; Gayle, F. W.; Sep. 2005; 86 pp.; In English

Report No.(s): PB2007-104579; No Copyright; Avail.: CASI: A05, Hardcopy

This report reviews the contemporaneous (1960s era) steel and welding standards used to construct the 110-story World Trade Center (WTC) towers. It describes the major structural elements in the towers and the many grades of steels relevant to the WTC investigation. Although ASTM International structural steel standards have evolved since the towers were built, the changes are generally minor and not significant for estimating mechanical properties.

NTIS

Buildings; Damage; Fire Prevention; Steels

20070004857 Jensen (Rolf) and Associates, Inc., Springfield, VA, USA

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety, and Structural Systems of World Trade Center 7. NIST NCSTAR 1-1I

Grill, R. A.; Johnson, D. A.; Fanella, D. A.; Sep. 2005; 46 pp.; In English

Report No.(s): PB2007-104577; No Copyright; Avail.: CASI: A03, Hardcopy

The collapse of World Trade Center (WTC) 1, 2, and 7 resulted from structural damage from direct and indirect effects of aircraft impact and the ensuing fires. Thus, for collapse analyses of these buildings, knowledge of the physical state of the structural and fire safety systems prior to the aircraft impact is essential. To obtain information for the collapse analysis of the buildings, National Institute of Standards and Technology reviewed design and construction documents, correspondence, and memoranda related to the building projects; interviewed individuals involved in the design, construction, and maintenance of the buildings; obtained information from regulatory and emergency services agencies of New York City; and reviewed books and published journal and magazine articles related to the WTC building projects. Information obtained from various sources are synthesized and summarized in this report. Specifically, this report presents (1) provisions used to design and construct the structural, fire protection and egress systems of the buildings; (2) tests performed to support the design of these systems; (3) criteria that governed the design of the structural and fire protection systems; (4) methods used to proportion structural members and other components of the buildings; (5) innovative features, technologies and materials that are incorporated in design and construction of the structural and fire protection systems; (6) details of deviations to the contract documents granted by Port Authority of New York and New Jersey; (7) fabrication and inspection requirements at the fabrication yard; and (8) inspection protocols during construction.

NTIS

Buildings; Construction; Damage; Fire Prevention; Safety

20070004859 Jensen (Rolf) and Associates, Inc., Springfield, VA, USA

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety Systems of the World Trade Center Towers. NIST NCSTAR 1-1H

Grill, R. A.; Johnson, D. A.; Sep. 2005; 142 pp.; In English

Report No.(s): PB2007-104576; No Copyright; Avail.: CASI: A07, Hardcopy

The collapse of World Trade Center (WTC) 1, 2, and 7 resulted from structural damage from direct and indirect effects of aircraft impact and the ensuing fires. Thus, for collapse analyses of these buildings, knowledge of the physical state of the structural and fire safety systems prior to the aircraft impact is essential. To obtain information for the collapse analysis of the buildings, National Institute of Standards and Technology reviewed design and construction documents, correspondence, and memoranda related to the building projects; interviewed individuals involved in the design, construction, and maintenance of the buildings; obtained information from regulatory and emergency services agencies of New York City; and reviewed books and published journal and magazine articles related to the WTC building projects. Information obtained from various sources are synthesized and summarized in this report. Specifically, this report presents (1) provisions used to design and construct the structural, fire protection and egress systems of the buildings; (2) tests performed to support the design of these systems; (3) criteria that governed the design of the structural and fire protection systems; (4) methods used to proportion structural members and other components of the buildings; (5) innovative features, technologies and materials that are incorporated in design and construction of the structural and fire protection systems; (6) details of deviations to the contract documents granted by Port Authority of New York and New Jersey; (7) fabrication and inspection requirements at the fabrication yard; and (8) inspection protocols during construction.

NTIS

Buildings; Construction; Damage; Fire Prevention; Safety; Towers

20070004861 Jensen (Rolf) and Associates, Inc., Springfield, VA, USA

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Amendments to the Fire Protection and Life Safety Provisions of the New York City Building Code by Local Laws Adopted While World Trade Center 1, 2, and 7 Were in Use. NIST NCSTAR 1-1G

Razza, J. C.; Grill, R. A.; Sep. 2005; 64 pp.; In English

Report No.(s): PB2007-104575; No Copyright; Avail.: CASI: A04, Hardcopy

This report was prepared to support the analysis of building and fire codes and practices of the National Institute of Standards and Technology (NIST) World Trade Center (WTC) Investigation. This report supports the objective of documenting the requirements that governed the design and construction of WTC 1, 2, and 7. The purpose of this report is to provide evolution of the life safety provisions of the Building Code of the City of New York (BCNYC) since the design of WTC 1 and WTC 2, including retroactive provisions for existing high-rise office towers. It has been previously established that WTC 1 and WTC 2 were designed and constructed in accordance with the BCNYC as enacted by Local Law No 76 for the year 1968, effective December 6, 1968. The evolution of the BCNYC begins with a brief history of the Building Code prior to 1968 and reviews the various local laws that have amended fire protection and life safety provisions of the Code from 1968 until the collapse of the WTC towers on September 11, 2001.

NTIS

Buildings; Damage; Fire Prevention; Laws; New York City (NY); Safety

20070004879 NASA Dryden Flight Research Center, Edwards, CA, USA

Incorporation of Half-Cycle Theory Into Ko Aging Theory for Aerostructural Flight-Life Predictions

Ko, William L.; Tran, Van T.; Chen, Tony; January 2007; 88 pp.; In English; Original contains black and white illustrations

Report No.(s): NASA/TP-2007-214608; H-2673; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004879; Avail.: CASI: A05, Hardcopy

The half-cycle crack growth theory was incorporated into the Ko closed-form aging theory to improve accuracy in the predictions of operational flight life of failure-critical aerostructural components. A new crack growth computer program was written for reading the maximum and minimum loads of each half-cycle from the random loading spectra for crack growth calculations and generation of in-flight crack growth curves. The unified theories were then applied to calculate the number of flights (operational life) permitted for B-52B pylon hooks and Pegasus adapter pylon hooks to carry the Hyper-X launching vehicle that air launches the X-43 Hyper-X research vehicle. A crack growth curve for each hook was generated for visual observation of the crack growth behavior during the entire air-launching or captive flight. It was found that taxiing and the

takeoff run induced a major portion of the total crack growth per flight. The operational life theory presented can be applied to estimate the service life of any failure-critical structural components.
Author
Crack Propagation; Aircraft Structures; B-52 Aircraft; Life (Durability); Bristol-Siddeley BS 53 Engine

20070004889 NASA Langley Research Center, Hampton, VA, USA
Simulation of Delamination Propagation in Composites Under High-Cycle Fatigue by Means of Cohesive-Zone Models
Turon, Albert; Costa, Josep; Camanho, Pedro P.; Davila, Carlos G.; December 2006; 34 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): MAT2003-09768-C03-01; PDCTE/50354/EME/2003
Report No.(s): NASA/TM-2006-214532; L-19304; Copyright; Avail.: CASI: A03, Hardcopy

A damage model for the simulation of delamination propagation under high-cycle fatigue loading is proposed. The basis for the formulation is a cohesive law that links fracture and damage mechanics to establish the evolution of the damage variable in terms of the crack growth rate dA/dN. The damage state is obtained as a function of the loading conditions as well as the experimentally-determined coefficients of the Paris Law crack propagation rates for the material. It is shown that by using the constitutive fatigue damage model in a structural analysis, experimental results can be reproduced without the need of additional model-specific curve-fitting parameters.
Author
Fracture Mechanics; Delaminating; Cohesion; Structural Analysis; Crack Propagation; Fatigue (Materials); Damage

20070005212 Goodwin (R. Christopher) and Associates, Inc., Frederick, MD USA
National Register Assessment of the Broadmoor Neighborhood, New Orleans, Orleans Parish, Louisiana
Kuranda, Kathryn M; Coyle, Katy; Sep 2003; 173 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DACW29-97-D-0018-0033
Report No.(s): AD-A459677; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459677; Avail.: CASI: A08, Hardcopy

R. Christopher Goodwin & Associates, Inc., completed the current study of the Broadmoor neighborhood of New Orleans, Louisiana. The goal of this study was to identify and to evaluate the built resources within the Broadmoor area through a reconnaissance-level architectural survey and the application of the National Register criteria for evaluation [36 CFR 60 (a-d)]. These investigations were conducted following the identification of potential historic properties in the vicinity of the ongoing Southeast Louisiana Urban Flood Control Project (SELA), a cooperative effort among the Corps of Engineers and Orleans, Jefferson, and St. Tammany parishes to improve drainage and to provide flood control in the New Orleans metropolitan area. The identification of a potential historic property in, and in the vicinity of the current SELA project prompted the USACE to reopen consultation under Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA). As directed under Section 800.13 (Post-Review Discoveries), the USACE has continued consultation with the Division of Historic Preservation. In addition, the USACE has undertaken a reconnaissance-level survey to define further the potential historic district for the purposes of Section 106 consultation and to develop mitigation for any adverse effects to previously unidentified historic properties. Two concentrations of buildings were identified that may qualify as historic districts. These are the area of initial development in Broadmoor (District #1), and the area defined the intersection of Claiborne and Louisiana Avenue.
DTIC
Buildings; Surveys

20070005369 General Accounting Office, Washington, DC USA
Defense Infrastructure: Continuing Challenges in Managing DOD Lodging Programs as Army Moves to Privatize Its Program
Holman, Barry W; Kennedy, Michael; Dickey, Claudia; Lenane, Kate; Sarapu, Leslie; Silvers, Julie; Weissman, Cheryl; Dec 2006; 42 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460005; GAO-07-164; No Copyright; Avail.: CASI: A03, Hardcopy

The Department of Defense (DoD) transient lodging programs were established to provide quality temporary facilities for authorized personnel, and to reduce travel costs through lower rates than commercial hotels. DoD has approximately 82,000 temporary duty (TDY) and permanent-change-of-station (PCS) rooms worldwide. These accommodations were reported to cost about $860 million in appropriated and nonappropriated funds to operate in fiscal year 2005. While the Army plans to

privatize its lodging in the USA, there are concerns as to whether these plans are cost-effective, and about how they relate to DoD-wide lodging efforts. GAO was asked to address the following issues: (1) how each military service and DoD manages, funds, and assesses the performance of its lodging programs to meet short- and long-term needs; and (2) the effect that lodging privatization would have on costs to the Army and on its ability to maintain and recapitalize facilities. GAO also is providing information on the status of DoD's actions on prior recommendations regarding the lodging program. GAO obtained data from the Office of the Secretary of Defense, the military services, and nine military installations. GAO is making recommendations to improve DoD's oversight of the lodging program. In commenting on a draft of this report, DoD agreed with the recommendations.
DTIC
Cost Effectiveness; Management Planning; Policies

20070005430 Curt Bjork Fastighet and Konsult AB, Sweden
Energy Savings Assessment Methodology - Cost Effective Ways of Establishing the Action Plan
Bjoerk, Curt; Feb 25, 2004; 29 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460125; No Copyright; Avail.: CASI: A03, Hardcopy

These briefing charts go with a consultant's lecture on systematic energy system analysis.
DTIC
Cost Effectiveness; Energy Conservation

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*.

20070003527 Geological Survey, Washington, DC USA
Drainage-Area Data for Wisconsin Streams
Jan 1983; 327 pp.; In English
Report No.(s): AD-A459549; No Copyright; Avail.: CASI: A15, Hardcopy

No abstract available
Drainage; Streams; Wisconsin

20070003528 Geological Survey, Washington, DC USA
Installation and Sampling of Observation Wells and Analyses of Water From the Shallow Aquifer at Selected Waste-Disposal Sites in the Memphis Area, Tennessee
Jan 1989; 37 pp.; In English
Report No.(s): AD-A459550; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Aquifers; Installing; Sampling; Waste Disposal; Water; Wells

20070003529 Geological Survey, Washington, DC USA
Ground-Water and Pond Levels, Cape Code, Massachusetts, 1950-82
Jan 1984; 89 pp.; In English
Report No.(s): AD-A459544; 26; No Copyright; Avail.: CASI: A05, Hardcopy

No abstract available
Ground Water; Ponds

20070003530 Geological Survey, Washington, DC USA
Ground-Water Quality Data From the Northern Mississippi Embayment--Arkansas, Missouri, Kentucky, Tennessee, and Mississippi
Jan 1985; 20 pp.; In English
Report No.(s): AD-A459541; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Ground Water; Mississippi; Water Quality

20070003603 Geological Survey, Washington, DC USA

Drainage Areas of Streams at Selected Locations in Kentucky

Jan 1981; 122 pp.; In English

Report No.(s): AD-A459553; No Copyright; Avail.: CASI: A06, Hardcopy

No abstract available

Drainage; Position (Location); Streams

20070003604 Geological Survey, Washington, DC USA

Construction, Geologic, and Water-Level Data for Observation Wells Near Brentwood, Williamson County, Tennessee

Jan 1989; 32 pp.; In English

Report No.(s): AD-A459537; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Construction; Tennessee; Water; Wells

20070003608 Geological Survey, Washington, DC USA

Water Resources Publications of the U.S. Geological Survey for Tennessee, 1906-1987

Jan 1988; 38 pp.; In English

Report No.(s): AD-A459532; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Geological Surveys; Water Resources

20070003813 Mitre Corp., Bedford, MA USA

State of the Art in Anomaly Detection and Reaction

Jul 1999; 38 pp.; In English

Contract(s)/Grant(s): F19628-99-C-0001

Report No.(s): AD-A459588; MP-99B0000020; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Anomalies; Reaction; Detection

20070003874 Earth Search, Inc., New Orleans, LA USA

Assessment of Historic Landscape, Highway 45 Borrow Pit, Jefferson Parish, Louisiana

Oct 2003; 92 pp.; In English

Contract(s)/Grant(s): DAWC29-97-D-0016-0029

Report No.(s): AD-A459655; No Copyright; Avail.: CASI: A05, Hardcopy

No abstract available

Highways; Terrain; Topography

20070004823 Army Tank-Automotive Research and Development Command, Warren, MI USA

Passive Panoramic Image Fusion (PPIF) for 360 Degree Situational Awareness to Support Operations in Urban Terrain

Aug 2006; 10 pp.; In English

Report No.(s): AD-A459512; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Situational Awareness; Terrain; Cities; Images

20070005032 NASA Johnson Space Center, Houston, TX, USA

Not So Rare Earth? New Developments in Understanding the Origin of the Earth and Moon

Righter, Kevin; [2007]; 71 pp.; In English; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005032; Avail.: CASI: A04, Hardcopy

A widely accepted model for the origin of the Earth and Moon has been a somewhat specific giant impact scenario involving an impactor to proto-Earth mass ratio of 3:7, occurring 50-60 Ma after T(sub 0), when the Earth was only half accreted, with the majority of Earth's water then accreted after the main stage of growth, perhaps from comets. There have been many changes to this specific scenario, due to advances in isotopic and trace element geochemistry, more detailed, improved, and realistic giant impact and terrestrial planet accretion modeling, and consideration of terrestrial water sources

other than high D/H comets. The current scenario is that the Earth accreted faster and differentiated quickly, the Moon-forming impact could have been mid to late in the accretion process, and water may have been present during accretion. These new developments have broadened the range of conditions required to make an Earth-Moon system, and suggests there may be many new fruitful avenues of research. There are also some classic and unresolved problems such as the significance of the identical O isotopic composition of the Earth and Moon, the depletion of volatiles on the lunar mantle relative to Earth's, the relative contribution of the impactor and proto-Earth to the Moon's mass, and the timing of Earth's possible atmospheric loss relative to the giant impact.
Author
Earth-Moon System; Planetary Evolution; Earth (Planet); Geochemistry; Mass Ratios; Moon

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*.

20070003594 NASA Ames Research Center, Moffett Field, CA, USA
Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI
Potter, C. S.; [1997]; 1 pp.; In English; 1997 Spring Meeting, American Geopysical Union, 26-29 May 1997, Baltimore, MD, USA; No Copyright; Avail.: Other Sources; Abstract Only

This study describes the use of satellite data to calibrate a new climate-vegetation greenness function for global change studies. We examined statistical relationships between annual climate indexes (temperature, precipitation, and surface radiation) and seasonal attributes of the AVHRR Normalized Difference Vegetation Index (NDVI) time series for the mid-1980s in order to refine our empirical understanding of intraannual patterns and global abiotic controls on natural vegetation dynamics. Multiple linear regression results using global l(sup o) gridded data sets suggest that three climate indexes: growing degree days, annual precipitation total, and an annual moisture index together can account to 70-80 percent of the variation in the NDVI seasonal extremes (maximum and minimum values) for the calibration year 1984. Inclusion of the same climate index values from the previous year explained no significant additional portion of the global scale variation in NDVI seasonal extremes. The monthly timing of NDVI extremes was 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 l(sup o) 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 at a series of ecosystem test locations from around the globe. Regions in which NDVI seasonal extremes were not accurately predicted are mainly high latitude ecosystems and other remote locations where climate station data are sparse.
Author
Calibrating; Normalized Difference Vegetation Index; Time Series Analysis; Image Classification; Remote Sensing; Satellite Imagery; Satellite Observation; Climate Change

20070003599 NASA Stennis Space Center, Stennis Space Center, MS, USA
Sensor to User - NASA/EOS Data for Coastal Zone Management Applications Developed from Integrated Analyses: Verification, Validation and Benchmark Report
Hall, Callie; Arnone, Robert; [2006]; 50 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): NNS05AB28; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003599; Avail.: CASI: A03, Hardcopy

The NASA Applied Sciences Program seeks to transfer NASA data, models, and knowledge into the hands of end-users by forming links with partner agencies and associated decision support tools (DSTs). Through the NASA REASoN (Research, Education and Applications Solutions Network) Cooperative Agreement, the Oceanography Division of the Naval Research Laboratory (NRLSSC) is developing new products through the integration of data from NASA Earth-Sun System assets with coastal ocean forecast models and other available data to enhance coastal management in the Gulf of Mexico. The recipient federal agency for this research effort is the National Oceanic and Atmospheric Administration (NOAA). The contents of this report detail the effort to further the goals of the NASA Applied Sciences Program by demonstrating the use of NASA satellite products combined with data-assimilating ocean models to provide near real-time information to maritime users and coastal

managers of the Gulf of Mexico. This effort provides new and improved capabilities for monitoring, assessing, and predicting the coastal environment. Coastal managers can exploit these capabilities through enhanced DSTs at federal, state and local agencies. The project addresses three major issues facing coastal managers: 1) Harmful Algal Blooms (HABs); 2) hypoxia; and 3) freshwater fluxes to the coastal ocean. A suite of ocean products capable of describing Ocean Weather is assembled on a daily basis as the foundation for this semi-operational multiyear effort. This continuous realtime capability brings decision makers a new ability to monitor both normal and anomalous coastal ocean conditions with a steady flow of satellite and ocean model conditions. Furthermore, as the baseline data sets are used more extensively and the customer list increased, customer feedback is obtained and additional customized products are developed and provided to decision makers. Continual customer feedback and response with new improved products are required between the researcher and customer. This document details the methods by which these coastal ocean products are produced including the data flow, distribution, and verification. Product applications and the degree to which these products are used successfully within NOAA and coordinated with the Mississippi Department of Marine Resources (MDMR) is benchmarked.
Author

Data Management; Education; Flow Distribution; Information Flow; Real Time Operation; Ocean Models; Oceanography; Data Products; Remote Sensing; Technology Utilization

20070003725 NASA Stennis Space Center, Stennis Space Center, MS, USA

Extending NASA Research Results to Benefit Society: Rapid Prototyping for Coastal Applications

Glorioso, Mark V.; Miller, Richard L.; Hall, Callie M.; McPherson, Terry R.; [2006]; 1 pp.; In English; Original contains color illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003725; Avail.: CASI: A01, Hardcopy

The mission of the NASA Applied Sciences Program is to expand and accelerate the use of NASA research results to benefit society in 12 application areas of national priority. ONe of the program's major challenges is to perform a quick, efficient, and detailed review (i.e., prototyping) of the large number of combinations of NASA observations and results from Earth system models that may be used by a wide range of decision support tools. A Rapid Prototyping Capacity (RPC) is being developed to accelerate the use of NASA research results. Here, we present the conceptual framework of the Rapid Prototyping Capacity within the context of quickly assessing the efficacy of NASA research results and technologies to support the Coastal Management application. An initial RPC project designed to quickly evaluate the utility of moderate-resolution MODIS products for calibrating/validating coastal sediment transport models is also presented.
Author

Rapid Prototyping; NASA Programs; Remote Sensing; Coastal Water

20070005219 Goodwin (R. Christopher) and Associates, Inc., New Orleans, LA USA

Phase I Cultural Resources Survey and Archeological Inventory of a Proposed 1.12 ha (2.87 ac) Borrow Pit and an Associated Access Road, Ascension Parish, Louisiana

Labadia, Catherine; Pokrant, Marie; Pincoske, Jeremy; George, David; Oct 2004; 96 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DACW29-01-D-0017-0007

Report No.(s): AD-A459726; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459726; Avail.: CASI: A05, Hardcopy

This document presents the results of a Phase I cultural resources survey of a proposed borrow pit and associated access road in Ascension Parish, Louisiana. This survey was conducted by R. Christopher Goodwin & Associates, Inc., in July 2003; it was performed on behalf of the U.S. Army Corps of Engineers, New Orleans District. The proposed borrow pit is located on the right descending bank of the Mississippi River (northeast of River Mile 180), and it measures approximately 1.16 ha (2.87 ac) in size. This area was subject to pedestrian survey and backhoe trenching in order to identify any subsurface cultural features or material. In addition, the proposed access road that measures approximately 165 m (541 ft) in length by 15 m (49 ft) in width also was subjected to survey using the same field methods. Therefore, a total of 1.4 ha (3.4 ac) was examined for cultural resources as part of the proposed undertaking. The proposed project items were characterized as possessing moderate to high probability for containing intact cultural deposits based on results of the previous cultural resources investigation entitled Phase I Cultural Resources Survey and Archeological Inventory of the Alhambra to Hohen-Solms and Hohen-Solms to Modeste Project Items, Ascension and Iberville Parishes, Louisiana (George et al. 2000). Despite an intensive field effort, his investigation failed to result in the identification of any archeological sites or historic structures within the Areas of Potential Effect. Phase I cultural resources survey and archeological inventory of the proposed borrow pit and access road project items resulted in the identification of only modern (i.e., post 1950) cultural material. No additional testing of the proposed borrow pit and associated access road is recommended.

DTIC

Alternating Current; Archaeology; Cultural Resources; Inventories; Roads; Surveys

20070005233 North Carolina Univ., Chapel Hill, NC USA

Use of Stochastic Modeling of Stratigraphic Relationships in High Resolution Seismic Reflection Data for Prediction of the Distribution of Acoustic and Geotechnical Property Variability in Near Surface Sediments on the East China Sea Continental Margin

Bartek, Louis; Sep 2004; 25 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-99-1-0602

Report No.(s): AD-A459818; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459818; Avail.: CASI: A03, Hardcopy

During cruises in May and June of 1999, 7991 km of single channel high resolution seismic data and 5278 km of chirp sub-bottom and side-scan sonar data were collected from the continental margin of the East China Sea (ECS) and Yellow Sea. When these data are pooled with data collected in this region during cruises in 1993 and 1996 the total data available for analyses is 15,408 km of seismic profiles and 13,295 km of chirp sub-bottom and side-scan sonar data along with 51 gravity cores. Copies of these data were provided to the Naval Oceanographic Office at Bay St. Louis, Mississippi. These data were processed to minimize noise and subjected to seismic stratigraphic analyses. Correlation of the data with published drill core descriptions indicate that the seismic profiles image stratigraphy that extends back to at least 200,000 years before present. The results of these analyses revealed that the stratigraphy of the margin was strongly impacted by glacially driven sea level fluctuations that produced regional unconformities that can be used to subdivide the stratigraphy into Lowstand (LST). Transgressive (TST) and (Highstand) systems tracts.

DTIC

Acoustic Properties; China; Distribution (Property); Geotechnical Engineering; High Resolution; Seas; Sediments; Stochastic Processes; Stratigraphy; Variability

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*.

20070003706 Army Construction Engineering Research Lab., Champaign, IL USA

New Technologies for New and Existing Buildings Allowing for Energy Conservation

Sep 1, 2004; 132 pp.; In English

Report No.(s): AD-A459461; ERDC/CERL-SR-04-26; No Copyright; Avail.: CASI: A07, Hardcopy

No abstract available

Buildings; Energy Conservation; Technology Utilization

20070003779 Nexant, CA, USA, Kearney and Associates, Vashon, WA, USA

Thermal Storage Commercial Plant Design Study for a 2-Tank Indirect Molten Salt System. Final Report for May 13, 2002 to December 31, 2004

Kelly, B.; Kearney, D.; Jul. 2006; 36 pp.; In English

Report No.(s): DE2006-887348; NREL/SR-550-40166; No Copyright; Avail.: National Technical Information Service (NTIS)

The development of a near-term thermal energy storage (TES) option is a major breakthrough for parabolic trough solar power plant technology. The 2-tank indirect TES concept proposed by Nexant and SunLab is being implemented in the AndaSol 50 MWe (net) trough plant currently under development in Spain. The project will have between 6-12 hours of TES depending on the economic optimization. In the U.S., Duke Solar is seriously considering this option where operational and economic factors favor its use. The economic optimum depends on the cost and performance of the TES system. The cost and performance of the indirect TES system are not independent because the size (cost) of the heat exchanger affects the physical size of the storage system and the performance of the turbine. The objectives of this Task were to develop a set of conceptual designs for 2-tank molten salt thermal energy storage (TES) systems of varying thermal capacities for trough plants, and to estimate levelized electricity costs for optimized plant configurations with storage. The solar plant assumed in the analysis is the Solar Electric Generating System (SEGS)-type plant using VP-1 for the solar field heat transport fluid.

NTIS

Heat Storage; Molten Salts; Plant Design; Solar Collectors

20070003781 National Renewable Energy Lab., Golden, CO USA

Surface Analysis

January 2006; 8 pp.; In English

Report No.(s): DE2006-887346; No Copyright; Avail.: National Technical Information Service (NTIS)

Surface analytical techniques help to determine the chemical, elemental, and molecular composition, and electronic structure of material surfaces and interfaces. The properties of the surface and outer few micrometers of a material often control the electrical, chemical, or mechanical properties of that material hence, this region is of extreme importance. Our techniques use ions, electrons, and X-ray or ultraviolet photons in high vacuum to probe surfaces and interfaces of a material. We map the elemental and chemical composition of specimens, study impurities and grain boundaries, gather bonding and chemical-state information, measure surface electronic properties, and perform depth profiles to determine doping and elemental distributions. We have analyzed a wide range of materials, including photovoltaics, microelectronics, polymers, and biological specimens. We work collaboratively with you to solve materials- and device related R&D problems. This sheet describes our major technique capabilities.

NTIS

Photovoltaic Conversion; Surface Properties

20070003782 National Renewable Energy Lab., Golden, CO USA

Electro-Optical Characterization

January 2006; 8 pp.; In English

Report No.(s): DE2006-887345; No Copyright; Avail.: National Technical Information Service (NTIS)

We use various electrical and optical experimental techniques to relate photovoltaic device performance to the methods and materials used to produce them. The types of information obtained by these techniques range from small-scale atomic-bonding information to large-scale macroscopic quantities such as optical constants and electron-transport properties. Accurate, timely measurements of electro-optical properties as a function of device processing provide the knowledge needed to troubleshoot problems and develop the knowledge base for reducing cost, maximizing efficiency, improving reliability, and enhancing manufacturability. We work collaboratively with you to solve materials- and device-related R&D problems. This sheet summarizes our primary techniques and capabilities.

NTIS

Characterization; Electro-Optics; Photovoltaic Conversion; Solar Cells

20070003783 Nexant, CA, USA, Kearney and Associates, Vashon, WA, USA

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 2: Comparison of Wet and Dry Rankine Cycle Heat Rejection. Report for January 20, 2005 to December 31, 2005

Kelly, B.; Jul. 2006; 32 pp.; In English

Report No.(s): DE2006-887344; NREL/SR-550-40163; No Copyright; Avail.: National Technical Information Service (NTIS)

Subcontract report by Nexant, Inc., regarding a system analysis comparing solar parabolic trough plants with wet and dry rankine cycle heat rejection.

NTIS

Dry Heat; Electricity; Parabolic Reflectors; Rankine Cycle; Systems Analysis

20070003784 Nexant, CA, USA, Kearney and Associates, Vashon, WA, USA

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 3: Multiple Plants at a Common Location. Report for January 20, 2005 to December 31, 2005

Kelly, B.; Jul. 2006; 36 pp.; In English

Report No.(s): DE2006-887342; NREL/SR-550-40164; No Copyright; Avail.: National Technical Information Service (NTIS)

Nine Solar Electric Generating Station (SEGS) parabolic trough solar power plants, ranging in capacity from 13.5 MWe to 89 MWe, are located in the southern California desert. Each of the plants is located adjacent to at least one other plant: SEGS I and II at Daggett; SEGS III through VII at Kramer Junction; and SEGS VIII and IX at Harper Lake. The plants are co-located to take advantage of common site permits, evaporation ponds, access to utility transmission lines, and sharing of the operation and maintenance staff. However, each of the projects was privately financed and constructed separately from the adjoining projects. This is a Subcontract report by Nexant, Inc., regarding a system analysis of multiple solar parabolic trough plants at a common location.
NTIS
Construction; Electric Power Plants; Parabolic Reflectors; Position (Location); Solar Energy Conversion; Systems Analysis

20070003786 Nexant, CA, USA
Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 1: Preferred Plant Size. Report for January 20, 2005 to December 31, 2005
Kelly, B.; Jul. 2006; 64 pp.; In English
Report No.(s): DE2006-887340; NREL/SR-550-40162; No Copyright; Avail.: National Technical Information Service (NTIS)

The Rankine cycles for commercial parabolic trough solar projects range in capacity from 13.5 MWe at the Solar Electric Generating Station I (SEGS I) plant, to a maximum of 89 MWe at the SEGS VIII / IX plants. The series of SEGS projects showed a consistent reduction in the levelized energy cost due to a combination of improvements in collector field technology and economies of scale in both the Rankine cycle and the operation and maintenance costs. Nonetheless, the question of the optimum Rankine cycle capacity remains an open issue. The capacities of the SEGS VIII / IX plants were limited by Federal Energy Regulatory Commission and Public Utility Regulatory Policy Act requirements to a maximum net output of 80 MWe. Further improvements in the Rankine cycle efficiency, and economies of scale in both the capital and the operating cost, should be available at larger plant sizes. An analysis was conducted to determine the effect of Rankine cycle capacities greater than 80 MWe on the levelized energy cost.
NTIS
Cost Estimates; Electric Power Plants; Parabolic Reflectors; Solar Energy Conversion; Systems Analysis

20070004974 Department of Energy, Washington, DC, USA
Parabolic Trough VSHOT Optical Characterization in 2005-2006
Wendelin, T.; January 2006; 32 pp.; In English
Report No.(s): DE2006-889350; NREL/PR-550-40024; No Copyright; Avail.: National Technical Information Service (NTIS)

This presentation regarding parabolic trough VSHOT optical characterization describes trough deployment and operation phases including: development, manufacture/installation, and maintenance/operation.
NTIS
Characterization; Optical Properties; Optical Scanners; Parabolic Reflectors; Solar Collectors

20070004976 National Renewable Energy Lab., Golden, CO USA
Trough Receiver Heat Loss Testing
Lewandowski, A.; Feik, C.; Hansen, R.; Phillips, S.; Bingham, C.; Feb. 2006; 15 pp.; In English
Report No.(s): DE2006-889349; NREL/PR-550-40023; No Copyright; Avail.: National Technical Information Service (NTIS)

This presentation describes the design, fabrication, and qualification of an experimental capability for thermal loss testing of full-size trough receiver elements; and the testing on a variety of receivers.
NTIS
Cooling; Parabolic Reflectors; Receivers; Solar Collectors; Troughs

20070005068 National Renewable Energy Lab., Golden, CO USA, PowerLight Corp., Berkeley, CA, USA
Accelerating PV Cost Effectiveness Through Systems Design, Engineering, and Quality Assurance. Phase 1 Annual Technical Report, November 4, 2004-November 3, 2005
Botkin, J.; Mitchell, R. L.; Jul. 2006; 87 pp.; In English
Report No.(s): DE2006-889146; NREL/SR-520-40335; No Copyright; Avail.: National Technical Information Service (NTIS)

During Phase I of this PV Manufacturing R&D subcontract, PowerLight Corporation has made significant progress toward the reduction of installed costs for commercial-scale, rooftop PV systems. PowerLight has worked to reduce operating costs by improving long-term reliability and performance through the development of more sophisticated tools used in system design and monitoring. Additionally, PowerLight has implemented design improvements with the goal of reducing cost while maintaining and/or improving product quality. As part of this effort, PowerLight also modified manufacturing and shipping processes to accommodate these design changes, streamline material flow, reduce cost, and decrease waste streams. During Phase II of this project, PowerLight plans to continue this work with the goal of reducing system cost and improving system performance.

NTIS

Cost Effectiveness; Manufacturing; Photovoltaic Conversion; Quality Control; Solar Energy; Systems Engineering

20070005100 National Renewable Energy Lab., Golden, CO USA

Powered by the Sun, 2007 Solar Decatholon

Jun. 2006; 8 pp.; In English

Report No.(s): DE2006-886837; DOE/GO-102006-2311; No Copyright; Avail.: National Technical Information Service (NTIS)

Originally conceived in 1999, the simple idea to test the power of the sun in 10 contests grew into one of the most ambitious and inspiring events in the country the Solar Decathlon. The 2007 Solar Decathlon challenges 20 college teams from around the globe in 10 contests to see which team can design, build, and operate the most livable and energy-efficient completely solar-powered house. And, while the competition will crown a first-place finisher, this truly is a competition we all win. Through their work, the students will demonstrate winning choices about living with abundance, style, and comfort using only the power of the sun. That is the promise of the Solar Decathlon.

NTIS

Solar Energy; Sun

20070005136 NASA Glenn Research Center, Cleveland, OH, USA

Re-Evaluating Satellite Solar Power Systems for Earth

Landis, Geoffrey A.; [2006]; 4 pp.; In English; 4th World Conference on Photovoltaic Energy Conversion, 7-12 May 2006, Waikoloa, HI, USA

Contract(s)/Grant(s): WBS 22-390-30-20; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005136; Avail.: CASI: A01, Hardcopy

The Solar Power Satellite System is a concept to collect solar power in space, and then transport it to the surface of the Earth by microwave (or possibly laser) beam, where if is converted into electrical power for terrestrial use. The recent increase in energy costs, predictions of the near-term exhaustion of oil, and prominence of possible climate change due to the ‘greenhouse effect’ from burning of fossil fuels has again brought alternative energy sources to public attention, and the time is certainly appropriate to reexamine the economics of space based power. Several new concepts for Satellite Power System designs were evaluated to make the concept more economically feasible.

Author

Solar Power Satellites; Spacecraft Power Supplies; Microwaves; Laser Beams; Energy Technology

20070005145 Sandia National Labs., Albuquerque, NM USA

Thermally-Related Safety Issues Associated with Thermal Batteries

Guidotti, R. A.; Jun. 2006; 18 pp.; In English

Report No.(s): DE2006-889003; SAND2006-1902; No Copyright; Avail.: Department of Energy Information Bridge

Thermal batteries can experience thermal runaway under certain usage conditions. This can lead to safety issues for personnel and cause damage to associated test equipment if the battery thermally self destructs. This report discusses a number of thermal and design related issues that can lead to catastrophic destruction of thermal batteries under certain conditions. Contributing factors are identified and mitigating actions are presented to minimize or prevent undesirable thermal runaway.

NTIS

Electric Batteries; Safety; Thermal Batteries

20070005265 South Carolina Univ., Columbia, SC USA

Soldier System Power Sources

Dougal, Roger A; Gao, Lijun; Dec 31, 2006; 31 pp.; In English

Contract(s)/Grant(s): N00014-03-1-0952

Report No.(s): AD-A459870; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459870; Avail.: CASI: A03, Hardcopy

This work addressed five key issues related to effective use of electric energy by dismounted troops, working both at the individual level and at the squad level, with the fundamental goal of reducing the total mass of the electric power sources carried by a Marine in the Expeditionary Forces while still meeting all of his electric power demands. To achieve that goal, this work investigated the effectiveness of hybrid power sources composed variously of batteries, fuel cells, and super capacitors, it developed control algorithms for those hybrid power sources, it assessed the value of recovering energy from partially spent primary cells, it developed more-efficient methods of capturing energy from photovoltaic sources, and it developed simulation-based tools for planning the carriage of sufficient electric energy to power specific suites of equipment as necessary to accomplish specific missions.

DTIC

Capacitors; Electric Batteries; Fuel Cells; Supplying

20070005277 Washington Univ., Seattle, WA USA

Secure Broadcast in Energy-Aware Wireless Sensor Networks

Lazos, Loukas; Poovendran, Radha; Jan 2002; 3 pp.; In English

Contract(s)/Grant(s): DAAD19-02-1-0242

Report No.(s): AD-A459885; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459885; Avail.: CASI: A01, Hardcopy

This paper considers the problem of securing multicast communications in an energy-constrained ad-hoc network environment. The authors show that existing efficient key distribution techniques for wired networks that rely on logical hierarchies are extremely energy inefficient for energy-constrained wireless ad-hoc networks. They also show that the joint consideration of routing and physical layer algorithms is critical for developing energy-efficient key distribution. They formulate the correct problem and show that the solution is hard to compute, and then present a greedy, routing-aware key-distribution algorithm that is easy to compute*.

DTIC

Broadcasting; Computer Networks; Data Transmission; Energy Conservation; Security; Wireless Communication

20070005278 Washington Univ., Seattle, WA USA

VP3: Using Vertex Path and Power Proximity for Energy Efficient Key Distribution

Lazos, Loukas; Salido, Javier; Poovendran, Radha; Jan 2004; 6 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-02-1-0242; DAAD19-01-2-0011

Report No.(s): AD-A459886; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459886; Avail.: CASI: A02, Hardcopy

This paper investigates the problem of energy-efficient key distribution for securing multicast communications in wireless ad hoc networks. Recently, the authors showed that a cross-layer design approach for key distribution, incorporating network layer (routing) as well as physical layer (energy) parameters, leads to energy savings. They also showed that heuristics are needed to reduce computational complexity. In this paper, the authors show that further reduction in energy expenditure is achieved by assigning common keys to nodes that receive messages from a sender via a common path. They develop a computationally viable heuristic called VP3 that uses codewords to represent paths and groups nodes based on the length of the common path, derived by the Hamming distance between codewords. They also present simulation results to illustrate the improvements achieved by VP3.

DTIC

Computer Networks; Data Transmission; Energy Conservation; Security; Wireless Communication

20070005279 Washington Univ., Seattle, WA USA

Maximizing Static Network Lifetime of Wireless Broadcast Adhoc Networks

Kang, Intae; Poovendran, Radha; Jan 2003; 7 pp.; In English

Contract(s)/Grant(s): DAAD19-02-1-0242

Report No.(s): AD-A459887; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459887; Avail.: CASI: A02, Hardcopy

The authors investigate the problem of energy-efficient broadcast routing over wireless static ad-hoc networks in which host mobility is not involved. They define the lifetime of a network as the duration of time until the first node failure due to battery depletion. They provide a globally optimal solution to the problem of maximizing a static network lifetime through a graph theoretic approach. They also provide extensive comparative simulation studies.
DTIC
Broadcasting; Computer Networks; Energy Conservation; Signal Processing; Wireless Communication

20070005280 Washington Univ., Seattle, WA USA
Cross-Layer Design for Energy-Efficient Secure Multicast Communications in Ad Hoc Networks
Lazos, Loukas; Poovendran, Radha; Jan 2004; 8 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAAD19-02-1-0242; DAAD19-01-2-0011
Report No.(s): AD-A459888; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459888; Avail.: CASI: A02, Hardcopy

The authors consider the problem of secure multicast in an energy-constrained wireless environment. They present an analytical formulation of the energy expenditure associated with the communication overhead of key management, and highlight its dependence on network topology and key distribution method. They show that the optimal solution of this formulation does not scale with multicast group size and propose a sub-optimal, cross-layer, low-complexity algorithm for energy-efficient key distribution. Simulation studies are presented to show the energy savings achieved by their scheme, and its performance is compared when different routing algorithms are employed (i.e., Broadcast Incremental Power (BIP), the Embedded Wireless Multicast Advantage (EWMA), the Minimum Spanning Tree (MST), and Shortest Path Routing (SPR)).
DTIC
Communication Networks; Computer Networks; Data Transmission; Energy Conservation; Security; Wireless Communication

20070005281 Washington Univ., Seattle, WA USA
A Comparison of Power-Efficient Broadcast Routing Algorithms
Kang, Intae; Poovendran, Radha; Jan 2003; 7 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAAD19-02-1-0242
Report No.(s): AD-A459889; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459889; Avail.: CASI: A02, Hardcopy

Following the seminal work of Wieselthier et al. on power-efficient broadcast routing, a novel technique called Embedded Wireless Multicast Advantage (EWMA) was proposed to further reduce the total transmit power of a broadcast routing tree. In the authors' previous work, they showed that when the network lifetime is defined as the time for the first node failure due to battery depletion, the total transmit power is not the only measure of power efficiency. They proved that either maximum transmit power or link longevity plays a crucial role in extending the network lifetime. In this paper, they compare the performance of four known power-efficient algorithms (and their variants), not only in terms of the total transmit power, but also in terms of other performance measures such as static network lifetime, total receive and interference power, and maximum and average hop count, which have direct impacts on physical, link, and MAC layers, and on end-to-end network delay.
DTIC
Algorithms; Broadcasting; Computer Networks; Embedding; Energy Conservation; Power Efficiency; Signal Processing; Wireless Communication

20070005282 Washington Univ., Seattle, WA USA
A Novel Power-Efficient Broadcast Routing Algorithm Exploiting Broadcast Efficiency
Kang, Intae; Poovendran, Radha; Jan 2003; 6 pp.; In English
Contract(s)/Grant(s): DAAD19-02-1-0242
Report No.(s): AD-A459890; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459890; Avail.: CASI: A02, Hardcopy

It has been shown that the problem of finding a broadcast routing tree with minimum total transmit power is NP-hard. Hence, developing a heuristic power-efficient algorithm is crucial. The seminal work in this area is the well-known Broadcast Incremental Power (BIP) algorithm with a recent addition called Embedded Wireless Multicast Advantage (EWMA) algorithm. In this paper, the authors present yet another novel power-efficient algorithm for broadcast routing tree construction

called Greedy Perimeter Broadcast Efficiency (GPBE) algorithm. They also compare the performance of these algorithms.
DTIC
Algorithms; Broadcasting; Energy Conservation; Heuristic Methods; Power Efficiency; Topology; Wireless Communication

20070005347 Naval Facilities Engineering Command, Philadelphia, PA USA
Navy Energy/Water Program and Applicable Process Technologies
Gates, Gary; Feb 25, 2004; 112 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460019; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460019; Avail.: CASI: A06, Hardcopy

WHY CONSERVE ENERGY? Sec. 202. Energy Efficiency Improvement Goals. Through life-cycle cost-effective measures, each agency shall reduce energy consumption per gross square foot of its facilities, excluding facilities covered in section 203 of this order, by 30 percent by 2005 and 35 percent by 2010 relative to 1985. No facilities will be exempt from these goals unless they meet new criteria for exemptions, to be issued by the Department of Energy (DOE). * Sec. 203. Industrial and Laboratory Facilities. Through life-cycle cost-effective measures, each agency shall reduce energy consumption per square foot, per unit of production, or per other unit as applicable by 20 percent by 2005 and 25 percent by 2010 relative to 1990. No facilities will be exempt from these goals unless they meet new criteria for exemptions, as issued by DOE.
DTIC
Energy Conservation; Military Operations; Navy; Water

20070005348 Department of the Army, Fort Lewis, WA USA
Energy and Utilities Readiness for the Army Industrial Activities
Heumphreus, Garey R; Thiesse, Monty; Miller, Ron; Ullery, Duane; Feb 25, 2004; 18 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460020; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460020; Avail.: CASI: A03, Hardcopy

Preparing Army Installations for the 21st Century: (1) Reduce Waste; (2) Reduce Costs; (3) Improve Use of Space; (4) Reduce Process Times and Improve Efficiencies; (5) Measure Customer Satisfaction.
DTIC
Energy Conservation; Maintainability; Utilities

20070005373 Technical Research Centre of Finland, Helsinki, Finland
Session 7: Energy Saving Performance Contracts: Forms and Financing Options. Overview of Activities Related to Energy Efficiency Improvement in Finland
Pietilainen, Jorma; Sep 1, 2004; 49 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460013; No Copyright; Avail.: CASI: A03, Hardcopy

Key Elements of Energy Conservation Programme: (1) Development and commercialisation of energy efficient technology; (2) Economic means of steering; (3) Building regulation (e.g., new EU Directive); (4) Voluntary energy conservation agreements; (5) Energy audits and ESCO activities; (6) Information, training and motivating activities.
DTIC
Buildings; Energy Conservation; Environmental Surveys; Finland

20070005397 California Univ., Santa Cruz, CA USA
Nanoscale Devices for Solid State Refrigeration and Power Generation
Shakouri, Ali; Baskin, Jack; Jan 2004; 11 pp.; In English
Report No.(s): AD-A460084; No Copyright; Avail.: CASI: A03, Hardcopy

A brief review of various techniques to engineer nanoscale thermal and electrical properties of materials is given. The main emphasis is on various energy conversion mechanisms, particularly, thermo electric refrigeration and power generation. Recent experimental and theoretical results on superlattice and quantum dot thermoelectrics and solidstate and vacuum thermionic thin film devices are reviewed. We also present an overview of the research activities at the multi university Thermionic Energy Conversion Center on the design of solid-state and vacuum devices that could convert heat into electricity with hot side temperatures ranging from 300 to 650C and with high conversion efficiency.
DTIC
Nanotechnology; Refrigerating; Solid State; Thermoelectric Power Generation; Thermoelectricity

20070005423 Army Construction Engineering Research Lab., Champaign, IL USA

Workshop Introduction - Building Energy Performance Improvement Through Advanced Technologies, Smart Organization, and Financing

Sep 1, 2004; 15 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460115; ERDC/CERL-SR-04-26; No Copyright; Avail.: CASI: A03, Hardcopy

Energy savings performance contracts (ESPCs) are a relatively recent contracting development. ESPCs are used to obtain a variety of energy services ranging from commodity provision on a regional basis; to assumption of operation of utility plants and distribution system; to identification, implementation, and maintenance of energy and water efficiency capital improvements. ESPCs provide a means of obtaining needed resources such as manpower and technical expertise by paying for those resources through savings from reductions in facility energy use. Additional benefits may include reductions in greenhouse gas emissions and oil consumption, increases in energy efficiency, expansion of the use of renewable energy sources, and identification and implementation of energy and water saving measures. Depending on the nature of the agreement, ESPCs allow the private sector and Federal agencies to reduce energy consumption and improve efficiency in facilities, with potentially no capital investment from the end-user. However, it seems that ESPC contractors have exhausted the ‘low hanging fruit’ opportunities for energy savings. Future projects will likely be increasingly complex and require technical and methodological support that will allow for more detailed energy systems assessment, better understanding of the available technologies and their level of their maturity, accurate replacement technology benchmarking and economic guidance.

DTIC

Economics; Energy Conservation; Energy Consumption

20070005433 Department of Energy, Chicago, IL USA

ESPC Issues: DOE Super Energy Savings Performance Contracts

Drawer, Gordon; Oct 7, 2003; 22 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460136; ERDC/CERL-SR-04-26; No Copyright; Avail.: CASI: A03, Hardcopy

To reduce the cost and environmental impact of the Federal government by advancing energy efficiency and water conservation, promoting the use of distributed and renewable energy, and improving utility management decisions at Federal sites. The mission involves helping agencies meet their federal energy management goals Reduce energy consumption - Standard building energy per square foot to be reduced by 30 percent in 2005 and 35 percent in 2010 relative to 1985. -Industrial/laboratory energy to be reduced by 20 percent in 2005 and 25 percent in 2010 relative to 1990. Expand use of renewable energy - 2.5% of Federal facility electricity consumption by 2005. - 2.000 solar energy systems by 2000; 20000 by 2010. Implement best management practices for water conservation in 80% of Federal facilities by 2010. Reduce greenhouse gas emissions 30 percent by 2010 compared to 1990.

DTIC

Contract Management; Energy Conservation; Energy Consumption; Energy Policy; Industrial Plants; Water Management

20070005443 California Univ., Santa Cruz, CA USA

Solid-State and Vacuum Thermionic Energy Conversion

Shakouri, A; Bian, Z; Singh, R; Zhang, Y; Vashaee, D; Humphrey, T E; Schmidt, H; Zide, J M; Zeng, G; Bahk, J-H; Jan 2005; 17 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460151; No Copyright; Avail.: CASI: A03, Hardcopy

A brief overview of the research activities at the Thermionic Energy Conversion (TEC) Center is given. The goal is to achieve direct thermal to electric energy conversion with \g20% efficiency and \g1W/cm2 power density at a hot side temperature of 300-650 C. Thermionic emission in both vacuum and solid-state devices is investigated. In the case of solid-state devices, hot electron filtering using heterostructure barriers is used to increase the thermoelectric power factor. In order to study electron transport above the barriers and lateral momentum conservation in thermionic emission process, the current-voltage characteristic of ballistic transistor structures is investigated. Embedded ErAs nanoparticles and metal/semiconductor multilayers are used to reduce the lattice thermal conductivity. Cross-plane thermoelectric properties and the effective ZT of the thin film are analyzed using the transient Harman technique. Integrated circuit fabrication techniques are used to transfer the n- and p-type thin films on AlN substrates and make power generation modules with hundreds of thin film elements. For vacuum devices, nitrogen-doped diamond and carbon nanotubes are studied for emitters. Sb-doped highly oriented diamond and low electron affinity AlGaN are investigated for collectors. Work functions below 1.6eV and vacuum

thermionic power generation at temperatures below 700 C have been demonstrated.
DTIC
Energy Conversion; Solid State; Vacuum

20070005463 Technische Hochschule, Stuttgart, Germany
Energy Assessment Strategy and Energy Concepts for Industrial Facilities
Leven, Bernd; Weber, Christoph; Feb 25, 2004; 13 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460187; No Copyright; Avail.: CASI: A03, Hardcopy

SUMMARY: (1) Energy Concepts for Enterprises: * Cover the procurement, conversion, distribution and utilization of energy; * Based on a detailed analysis of the initial situation and planned modifications; * Should compare different options of measures and concepts; (2) Applicable Methodologies: * Energy characteristic (on different operational level); * Sankey diagrams and load curves; (3) Standardized Procedures and Software Tools: * Can significantly reduce time and costs.
DTIC
Electric Generators; Electric Power Plants; Industrial Plants

45
ENVIRONMENT POLLUTION

Includes atmospheric, water, soil, noise, and thermal pollution.

20070003600 NASA Langley Research Center, Hampton, VA, USA
Comparison of Satellite Observations of Nitrogen Dioxide to Surface Monitor Nitrogen Dioxide Concentration
Kleb, Mary M.; Pippin, Margaret R.; Pierce, R. Bradley; Neil, Doreen O.; Lingenfelser, Gretchen; Szykman, James J.; December 2006; 294 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 018-02-13-01-46
Report No.(s): NASA/TM-2006-214527; L-19315; Copyright; Avail.: CASI: A13, Hardcopy

Nitrogen dioxide is one of the U. S. EPA s criteria pollutants, and one of the main ingredients needed for the production of ground-level ozone. Both ozone and nitrogen dioxide cause severe public health problems. Existing satellites have begun to produce observational data sets for nitrogen dioxide. Under NASAs Earth Science Applications Program, we examined the relationship between satellite observations and surface monitor observations of this air pollutant to examine if the satellite data can be used to facilitate a more capable and integrated observing network. This report provides a comparison of satellite tropospheric column nitrogen dioxide to surface monitor nitrogen dioxide concentration for the period from September 1996 through August 1997 at more than 300 individual locations in the continental US. We found that the spatial resolution and observation time of the satellite did not capture the variability of this pollutant as measured at ground level. The tools and processes developed to conduct this study will be applied to the analysis of advanced satellite observations. One advanced instrument has significantly better spatial resolution than the measurements studied here and operates with an afternoon overpass time, providing a more representative distribution for once-per-day sampling of this photochemically active atmospheric constituent.
Author
Nitrogen Dioxide; Air Pollution; Satellite Observation; Earth Sciences; Photochemical Reactions; Ozone; Contaminants

20070003766 4th Wave Imaging Corp., Aliso Viejo, CA, USA
Time-Lapse Seismic Modeling and Inversion Modeling and Inversion of CO2 Saturation for Sequestration and Enhanced Oil Recovery
Meadows, M. A.; Mar. 31, 2006; 10 pp.; In English
Report No.(s): DE2006-888933; No Copyright; Avail.: Department of Energy Information Bridge

Injection of carbon dioxide (CO2) into subsurface aquifers for geologic storage/sequestration, and into subsurface hydrocarbon reservoirs for enhanced oil recovery, has become an important topic to the nation because of growing concerns related to global warming and energy security. In this project we developed new ways to predict and quantify the effects of CO2 on seismic data recorded over porous reservoir/aquifer rock systems. This effort involved the research and development of new technology to: (1) quantitatively model the rock physics effects of CO2 injection in porous saline and oil/brine reservoirs (both miscible and immiscible); (2) quantitatively model the seismic response to CO2 injection (both miscible and

immiscible) from well logs (1D); and (3) perform quantitative inversions of time-lapse 4D seismic data to estimate injected CO2 distributions within subsurface reservoirs and aquifers.
NTIS
Carbon Dioxide; Inversions; Oil Recovery; Saturation

20070003774 CH2M/Hill Hanford Group, Inc., Richland, WA, USA
Technical Basis Document for Natural Event Hazards
Kripps, L. J.; Jul. 2006; 38 pp.; In English
Report No.(s): DE2006-888844; No Copyright; Avail.: Department of Energy Information Bridge

This technical basis document was developed to support the documented safety analysis (DSA) and describes the risk binning process and the technical basis for assigning risk bins for natural event hazard (NEH)-initiated accidents. The purpose of the risk binning process is to determine the need for safety-significant structures, systems, and components (SSC) and technical safety requirement (TSR)-level controls for a given representative accident or represented hazardous conditions based on an evaluation of the frequency and consequence. Note that the risk binning process is not applied to facility workers, because all facility worker hazardous conditions are considered for safety-significant SSCs and/or TSR-level controls.
NTIS
Disasters; Hazards; Radiation

20070004730 California Univ., Berkeley, CA, USA
Review of Hazardous Chemical Species Associated with CO2 Capture from Coal-Fired Power Plants and their Potential Fate during CO2 Geologic Storage
Apps, J. A.; Mar. 2006; 64 pp.; In English
Report No.(s): DE2006-888971; No Copyright; Avail.: Department of Energy Information Bridge

Conventional coal-burning power plants are major contributors of excess CO2 to the atmospheric inventory. Because such plants are stationary, they are particularly amenable to CO2 capture and disposal by deep injection into confined geologic formations. However, the energy penalty for CO2 separation and compression is steep, and could lead to a 30-40 percent reduction in useable power output. Integrated gas combined cycle (IGCC) plants are thermodynamically more efficient, i.e., produce less CO2 for a given power output, and are more suitable for CO2 capture. Therefore, if CO2 capture and deep subsurface disposal were to be considered seriously, the preferred approach would be to build replacement IGCC plants with integrated CO2 capture, rather than retrofit existing conventional plants. Coal contains minor quantities of sulfur and nitrogen compounds, which are of concern, as their release into the atmosphere leads to the formation of urban ozone and acid rain, the destruction of stratospheric ozone, and global warming. Coal also contains many trace elements that are potentially hazardous to human health and the environment. During CO2 separation and capture, these constituents could inadvertently contaminate the separated CO2 and be co-injected. The concentrations and speciation of the co-injected contaminants would differ markedly, depending on whether CO2 is captured during the operation of a conventional or an IGCC plant, and the specific nature of the plant design and CO2 separation technology.
NTIS
Air Pollution; Carbon Dioxide; Coal; Coal Gasification; Combustion; Cycles; Pollution Control

20070004943 Forest Service, Portland, OR USA
Northwest Forest Plan-The First 10 Years (1994-2003): Synthesis of Monitoring and Research Results
Haynes, R. W.; Bormann, B. T.; Lee, D. C.; Martin, J. R.; Oct. 2006; 317 pp.; In English
Report No.(s): PB2007-103673; FSGTR-PNW-651; No Copyright; Avail.: National Technical Information Service (NTIS)

It has been 10 years since the Northwest Forest Plan (the Plan) came into being at the direction of President Clinton. This report synthesizes the status and trends of five major elements of the Plan: older forests, species, aquatic systems, socioeconomics, and adaptive management and monitoring. It synthesizes new science that has resulted from a decade of research. The report also contains key management implications for federal agencies. This report is a step in the adaptive management approach adopted by the Plan, and there is the expectation that its findings will lead to changes in the next decade of Plan implementation. Although most of the monitoring has been underway for less than a decade and many of the Plan's outcomes are expected to evolve over decades, the monitoring is already producing a wealth of data about the status and trends in abundance, extent, diversity, and ecological functions of older forests, the species that depend on them, and how humans relate to them.
NTIS
Environmental Monitoring; Forests; United States

20070004945 Environmental Protection Agency, Research Triangle Park, NC USA

NERL Air Quality Research: Moving Forward. EPA-NOAA Scientists-to-Scientists Meeting. Held on March 2-3, 2004

Foley, G.; Mar. 2004; 19 pp.; In English

Report No.(s): PB2007-103657; No Copyright; Avail.: National Technical Information Service (NTIS)

No abstract available

Air Quality; Exposure; Research

20070004985 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA

Leakage from Geologic Storage Reservoirs of CO2

Pruess, K.; Mar. 2006; 4 pp.; In English

Report No.(s): DE2006-889325; No Copyright; Avail.: National Technical Information Service (NTIS)

Large amounts of CO2 would need to be injected underground to achieve a significant reduction of atmospheric emissions. The large areal extent expected for CO2 plumes makes it likely that caprock imperfections will be encountered, such as fault zones or fractures, which may allow some CO2 to escape from the primary storage reservoir. Leakage of CO2 could also occur along wellbores. Concerns with escape of CO2 from a primary geologic storage reservoir include (1) acidification of groundwater resources, (2) asphyxiation hazard when leaking CO2 is discharged at the land surface, (3) increase in atmospheric concentrations of CO2, and (4) damage from a high-energy, eruptive discharge (if such discharge is physically possible). In order to gain public acceptance for geologic storage as a viable technology for reducing atmospheric emissions of CO2, it is necessary to address these issues and demonstrate that CO2 can be injected and stored safely in geologic formations.

NTIS

Carbon Dioxide; Leakage; Reservoirs

20070004990 Lawrence Livermore National Lab., Livermore, CA USA

Resistance of HEPA Filters in a Ventilation Duct on Leakpath Factor Calcuations

Ma, C. W.; Apr. 24, 2006; 20 pp.; In English

Report No.(s): DE2006-889449; UCRL-CONF-220799; No Copyright; Avail.: National Technical Information Service (NTIS)

The purpose of this report is to study the impact of the flow resistance of HEPA filters on leak path factor calculations.

NTIS

Air Filters; Ducts; Ventilation

20070004991 Lawrence Livermore National Lab., Livermore, CA USA

LLNL Heavy Element Facility-Facility Management, Authorization Basis, and Readiness Assessment Lessons Learned in the Heavy Element Facility (B251) Transition from Category II Nuclear Facility to Radiological Facility

Mitchell, M.; Anderson, B.; Brown, E.; Gray, L.; Apr. 12, 2006; 24 pp.; In English

Report No.(s): DE2006-889434; UCRL-CONF-220555; No Copyright; Avail.: National Technical Information Service (NTIS)

This paper presents Facility Management, Readiness Assessment, and Authorization Basis experience gained and lessons learned during the Heavy Element Facility Risk Reduction Program (RRP). The RRP was tasked with removing contaminated glove boxes, radioactive inventory, and contaminated ventilation systems from the Heavy Element Facility (B251) at Lawrence Livermore National Laboratory (LLNL). The RRP was successful in its goal in April 2005 with the successful downgrade of B251 from a Category II Nuclear Facility to a Radiological Facility. The expertise gained and the lessons learned during the planning and conduct of the RRP included development of unique approaches in work planning/work control ('Expect the unexpected and confirm the expected') and facility management. These approaches minimized worker dose and resulted in significant safety improvements and operational efficiencies. These lessons learned can help similar operational and management activities at other sites, including facilities restarting operations or new facility startup. B251 was constructed at LLNL to provide research areas for conducting experiments in radiochemistry using transuranic elements. Activities at B251 once included the preparation of tracer sets associated with the underground testing of nuclear devices and basic research devoted to a better understanding of the chemical and nuclear behavior of the transuranic elements.

NTIS

Heavy Elements; Radioactive Wastes; Radiology; Waste Management

20070005017 Humphreys Engineer Center Support Activity, Alexandria, VA, USA

Method and System for Treating Contaminants and Ordors in Airborne Emissions

Kim, B. J.; 4 Aug 04; 23 pp.; In English

Patent Info.: Filed Filed 4 Aug 04; US-Patent-Appl-SN-10-911-763

Report No.(s): PB2007-103883; No Copyright; Avail.: CASI: A03, Hardcopy

A second-generation rotating biofilter employing microorganisms in a microbiological film (biofilm) 'mineralizes' contaminants, such as VOCs and odoriferous contaminants. Contaminated fluid, such as air from manufacturing processes, is directed radially outward from a perforated pipe through porous foam attached to the pipe. The pipe serves as the axis upon which layers of foam suitable for supporting formation of biofilms are placed. In one embodiment, an octagonal-shaped drum incorporates eight baskets. In each basket, foam is layered outwardly from the pipe in trapezoidal-shaped layers each of approximately 3.8 cm thickness, each layer separated by air gaps of approximately 1.3 cm to prevent clogging. Seven layers in each of eight baskets comprise the octagonal drum. When the drum is sprayed on one side, water soaks the media and it is heavier on that side, thus facilitating rotation of the drum. Further, the biofilms are supplied with moisture and supplemental nutrients as needed.

NTIS

Air Pollution; Contaminants; Odors; Pollution Control

20070005018 Environmental Monitoring Systems, Riverhead, NY, USA

National Symposium on Recent Advances in Pollutant Monitoring of Ambient Air and Stationary Sources, Held at Raleigh, North Carolina May 3-6, 1983

Jan. 1984; 810 pp.; In English

Report No.(s): PB2007-106174; EPA 600/9-84/001; No Copyright; Avail.: CASI: A99, Hardcopy

Measurement and monitoring research efforts are designed to anticipate potential environmental problems, to support regulatory actions by developing an in-depth understanding of the nature and processes that impact health and the ecology, to provide innovative means of monitoring compliance with regulations and to evaluate the effectiveness of health and environmental protection efforts through the monitoring of long-term trends. The Environmental Monitoring Systems Laboratory, Research Triangle Park, North Carolina, has the responsibility for: assessment of environmental monitoring technology and systems; implementation of agency-wide quality assurance programs for air pollution measurement systems; and supplying technical support to other groups in the Agency including the Office of Air, Noise and Radiation, the Office of Pesticides and Toxic Substances and the Office of Solid Waste and Emergency Response. This symposium is part of a continuing effort to explore recent advances in pollutant monitoring of ambient air and stationary sources. It serves as a forum for exchange of ideas and scientific information. In response to the Agency regulatory needs, this symposium focused on acid deposition, personal exposure and toxic substances. This publication is intended to assist those researchers interested in furthering the science of air monitoring.

NTIS

Air Pollution; Air Sampling; Conferences; Contaminants; Pollution Monitoring

20070005026 Environmental Protection Agency, Washington, DC, USA

Inventory of Sources and Environmental Releases of Dioxin-Like Compounds in the USA for the Years 1987, 1995, and 2000

Nov. 2006; 677 pp.; In English

Report No.(s): PB2007-104361; EPA/600/P-03/002F; No Copyright; Avail.: National Technical Information Service (NTIS)

The purpose of this document is to present a comprehensive inventory and overview of sources and environmental releases of dioxin-like compounds in the USA. The major identified sources of environmental releases of dioxin-like compounds are grouped into six broad categories: combustion sources, metals smelting, refining and process sources, chemical manufacturing sources, natural sources, and environmental reservoirs. Estimates of annual releases to land, air, and water are presented for each source category and summarized for reference years 1987, 1995, and 2000. The quantitative results are expressed in terms of the toxicity equivalence (TEQ) of the mixture of polychlorinated dibenzo-p-dioxin (CDD) and polychlorinated dibenzofuran (CDF) compounds present in environmental releases using a procedure sanctioned by the World Health Organization (WHO) in 1998. This TEQ procedure translates the complex mixture of CDDs and CDFs characteristic of environmental releases into an equivalent toxicity concentration of 2,3,7,8-tetrachorodibenzo-p-dioxin (2,3,7,8-TCDD), the most toxic member of this class of compounds. Using this WHO procedure, the annual releases of TEQDF-WHO98 to the U.S. environment over the three reference years are 13,965 g in 1987, 3,444 g in 1995, and 1,422 g in 2000. This analysis indicates that between reference years 1987 and 2000, there was approximately a 90% reduction in the releases of dioxin-like

compounds to the circulating environment of the USA from all known sources combined. In 1987 and 1995, the leading source of dioxin emissions to the U.S. environment was municipal waste combustion; however, because of reductions in dioxin emissions from municipal waste combustors, it dropped to the fourth ranked source in 2000. Burning of domestic refuse in backyard burn barrels remained fairly constant over the years, but in 2000, it emerged as the largest source of dioxin emissions to the U.S. environment.
NTIS
Air Pollution; Inventories; United States

20070005036 Constellation Technology Corp., Saint Petersburg, FL, USA
Chemical Agent Detector
Manoosingh, L. L.; 21 Jan 04; 15 pp.; In English
Contract(s)/Grant(s): DTRA02-99-C-01 87
Patent Info.: Filed Filed 21 Jan 04; US-Patent-Appl-SN-10-761 729
Report No.(s): PB2007-102749; No Copyright; Avail.: CASI: A03, Hardcopy

A chemical agent detector utilizing surface acoustic wave (SAW) sensors for detecting the presence of a multitude of chemical agents by sampling ambient air is provided. A pressure-differential manifold having an air intake port, an exhaust port, a valve and a pump is used to draw the ambient air into the manifold to be tested. A plurality of SAW sensors mounted on sensor driver boards which are in turn mounted on the manifold come into contact with the ambient air sample. Each SAW sensor is coated with a substance that has an affinity for detecting a particular chemical agent. Each SAW sensor driver board generates a continuous RF signal which emits a frequency shift if a particular chemical agent is detected. A power cycler module turns each sensor driver board on and off such that only one sensor driver board is powered-on at a given point in time. An RF multiplexor receives the continuous RF signals generated by the sensor driver boards and outputs one of the RF signals to a microprocessor based upon a timing signal generated by the microprocessor. The microprocessor interprets the frequency shift as the detection of a chemical agent and provides an alarm that a particular chemical agent has been detected.
NTIS
Sound Waves; Surface Waves; Air Sampling; Pollution Monitoring

20070005115 Lawrence Livermore National Lab., Livermore, CA USA
Study of Stability Conditions in an Urban Area
Chan, S. T.; Lundquist, J. K.; Nov. 05, 2005; 14 pp.; In English
Report No.(s): DE2006-886669; No Copyright; Avail.: National Technical Information Service (NTIS)

Accurate numerical prediction of airflow and tracer dispersion in urban areas depends, to a great extent, on the use of appropriate stability conditions. Due to the lack of relevant field measurements or sufficiently sophisticated turbulence models, modelers often assume that nearly neutral conditions are appropriate to use for the entire urban area being simulated. The main argument for such an assumption is that atmospheric stability (as defined by the Richardson number) is determined by both mechanical stresses and buoyant forcing but, for a typical urban setting with a given thermal stability or sensible heat flux, buildinginduced mechanical stresses can become so dominant to drive the resulting stability toward nearly neutral conditions.
NTIS
Air Pollution; Cities; Pollution Monitoring; Stability

20070005116 Arizona Dept. of Environmental Quality, Phoenix, AZ, USA
Arizona Department of Environmental Quality: Air Quality Annual Report, 2005
January 2006; 132 pp.; In English
Report No.(s): PB2007-103704; No Copyright; Avail.: National Technical Information Service (NTIS)

This report presents the results of air quality monitoring conducted throughout Arizona in the 2004 calendar year. Data from more than 100 monitoring sites are included in this report. Many of the sites have multiple instruments measuring a variety of gaseous, particulate and visibility parameters. The majority of the air quality measurements are for criteria pollutants (ozone, particulate matter, sulfur dioxide, carbon monoxide, nitrogen dioxide and lead) for which EPA has established National Ambient Air Quality Standards (NAAQS). Visibility-related measurements are an increasing part of air monitoring activities in Arizona. In addition to the ADEQ monitoring network, air quality agencies in Maricopa, Pima and Pinal counties also operated networks, as did several industrial facilities. Their data are summarized in this report.
NTIS
Air Quality; Environmental Quality

20070005417 Ljubljana Univ., Ljubljana, Slovenia

The Role of Dosimetry in High-Quality EMI Risk Assessment

Sep 14, 2006; 92 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8655-06-1-5063

Report No.(s): AD-A460109; No Copyright; Avail.: CASI: A05, Hardcopy

The Final Proceedings for The role of EMF dosimetry in high quality risk assessment 13 September 2006 - 15 September 2006 In the last three decades the use of devices that emit electromagnetic fields (EMF) has increased dramatically. The proliferation of EMF devices has been accompanied by increased concern about ensuring the safety of their use. Thus accurate dosimetry represents an essential element of the research in determining the biological effects of electromagnetic fields. The seminar is covering the state of the science in the numerical and experimental dosimetry exposure assessment and problems in assessment of the corresponding uncertainty. It is extremely important to assess the uncertainty of the results due to the compliance requirements of the Directive of the European Parliament and of the Council 2004/40/EC. The aim of the EMF seminar is a proactive discussion of upcoming issues of human exposure assessment to reassure high-quality of the assessment and reliable results which can further on contribute to the needed human health protecting strategies. The seminar is organized in following areas: numerical and experimental methods oriented to deal with uncertainty exposure assessment in environment and workplaces standardization legislation and accreditation.

DTIC

Assessments; Dosimeters; Electromagnetic Fields; Ionizing Radiation; Risk

20070005428 Plymovent Ltd., Oxfordshire, UK

Energy Savings with a Scalable Source Capture Ventilation

Barnkow, Steve; Feb 26, 2004; 27 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460122; No Copyright; Avail.: CASI: A03, Hardcopy

Briefing charts go with a talk discussing on-demand variable speed ventilation systems by PlymoVent, LTD.

DTIC

Energy Conservation; Ventilation; Workstations

20070005429 Palm International, Inc., Lavergne, TN USA

Reduced Air Emissions for Hard Chrome Plating at the NADEP NAS North Island, San Diego Using an Alternative Emission Control Technology

Hutchins, Terry; Feb 26, 2004; 29 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460123; No Copyright; Avail.: CASI: A03, Hardcopy

The Naval Air Systems Command Depot (NADEP) facility located on the Naval Air Station (NAS) North Island, San Diego, CA currently has five (5) hard chrome plating tanks in operation. The facility typically plates 3-5 million amp-hours per year and is identified as a Small Hard Chromium Electroplating Facility by the San Diego Air Pollution Control District. This presentation addresses the implementation of encapsulating tank covers, hereafter referred to as the Chrome Plating Emission Elimination Device (EED), on the NADEP's hard chrome plating process tanks, as an alternate control devise used to eliminate Cr+6 emissions to the outside environment, reduce operating costs, and provide enhanced operator safety and exposure in the chrome plating facility.

DTIC

Air Quality; Chromium; Electroplating; Plating

47

METEOROLOGY AND CLIMATOLOGY

Includes weather observation forecasting and modification.

20070003609 Naval Research Lab., Monterey, CA USA

Software User's Manual for the Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS)

Nov 1996; 81 pp.; In English

Report No.(s): AD-A459798; NRL/MR/7543--96-7227; No Copyright; Avail.: CASI: A05, Hardcopy

No abstract available

Mesometeorology; Mesoscale Phenomena; User Manuals (Computer Programs); Oceanography

20070003742 Pacific Northwest National Lab., Richland, WA, USA

Analysis of Wintertime Winds in Washington, D.C

Berg, L. K.; Allwine, K. J.; May 2006; 38 pp.; In English

Report No.(s): DE2006-888709; PNNL-15799; No Copyright; Avail.: National Technical Information Service (NTIS)

This report describes the wintertime climatology of wind speed and wind direction around the National Mall in Washington, D.C. Meteorological data for this study were collected at Ronald Reagan Washington National Airport (Reagan National), Dulles International Airport (Dulles), and a set of surface meteorological stations located on several building tops around the National Mall. We present a 5-year wintertime climatology of wind speed and wind direction measured at Reagan National and Dulles. Also included is a more detailed analysis completed for the period December 2003 through February 2004 using data gathered from stations located around the National Mall, Reagan National, and Dulles.

NTIS

District of Columbia; Meteorological Parameters; Winter

20070004637 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Model Calculations of Solar Spectral Irradiance in the 3.7 Micron Band for Earth Remote Sensing Applications

Platnick, Steven; Fontenla, Juan M.; [2006]; 35 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NAS5-97045; 621-30-92; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004637; Avail.: CASI: A03, Hardcopy

Since the launch of the first Advanced Very High Resolution Radiometer (AVHRR) instrument aboard TIROS-N, measurements in the 3.7 micron atmospheric window have been exploited for use in cloud detection and screening, cloud thermodynamic phase and surface snow/ice discrimination, and quantitative cloud particle size retrievals. The utility of the band has led to the incorporation of similar channels on a number of existing satellite imagers and future operational imagers. Daytime observations in the band include both reflected solar and thermal emission energy. Since 3.7 micron channels are calibrated to a radiance scale (via onboard blackbodies), knowledge of the top-of-atmosphere solar irradiance in the spectral region is required to infer reflectance. Despite the ubiquity of 3.7 micron channels, absolute solar spectral irradiance data comes from either a single measurement campaign (Thekaekara et al. 1969) or synthetic spectra. In this study, we compare historical 3.7 micron band spectral irradiance data sets with the recent semi-empirical solar model of the quiet-Sun by Fontenla et al. (2006). The model has expected uncertainties of about 2 % in the 3.7 pm spectral region. We find that channel-averaged spectral irradiances using the observations reported by Thekaekara et al. are 3.2-4.1% greater than those derived from the Fontenla et al. model for MODIS and AVHRR instrument bandpasses; the Kurucz spectrum (1995) as included in the MODTRAN4 distribution, gives channel-averaged irradiances 1.2-1.5 % smaller than the Fontenla model. For the MODIS instrument, these solar irradiance uncertainties result in cloud microphysical retrievals uncertainties comparable with other fundamental reflectance error sources.

Author

Advanced Very High Resolution Radiometer; Thermal Emission; Solar Energy; Remote Sensing; Irradiance; MODIS (Radiometry); Cloud Physics; Thermal Energy

20070004930 ENSCO, Inc., Cocoa Beach, FL, USA

Objective Lightning Probability Forecasting for Kennedy Space Center and Cape Canaveral Air Force Station

Lambert, Winifred; Wheeler, Mark; 2005; 54 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NAS10-01052

Report No.(s): NASA/CR-2005-212564; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004930; Avail.: CASI: A04, Hardcopy

Five logistic regression equations were created that predict the probability of cloud-to-ground lightning occurrence for the day in the KSC/CCAFS area for each month in the warm season. These equations integrated the results from several studies over recent years to improve thunderstorm forecasting at KSC/CCAFS. All of the equations outperform persistence, which is known to outperform NPTI, the current objective tool used in 45 WS lightning forecasting operations. The equations also performed well in other tests. As a result, the new equations will be added to the current set of tools used by the 45 WS to determine the probability of lightning for their daily planning forecast. The results from these equations are meant to be used as first-guess guidance when developing the lightning probability forecast for the day. They provide an objective base from which forecasters can use other observations, model data, consultation with other forecasters, and their own experience to create the final lightning probability for the 1100 UTC briefing.

Author

Cloud-to-Ground Discharges; Thunderstorms; Weather Forecasting; Forecasting

20070004934 NASA Langley Research Center, Hampton, VA, USA
Validation of the Archived CERES Surface and Atmosphere Radiation Budget (SARB) at SGP
Charlock, Thomas P.; Rose, Fred G.; Rutan, David A.; [2003]; 6 pp.; In English; Thirteenth ARM Science Team Meeting Proceedings, 31 Mar. - 4 Apr. 2003, Broomfield, CO, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 109.431.07.01; Copyright; Avail.: CASI: A02, Hardcopy

The CERES Surface and Atmosphere Radiation Budget (SARB) product (Charlock et al, 2002) includes the vertical profile of broadband SW, broadband LW, and 8-12 micron window (WN) fluxes; upwelling and downwelling at TOA, 70 hPa, 200 hPa, 500 hPa, and the surface; and for all-sky and clear-sky conditions. We test the archived CERES TRMM record of SARB for January-August 1998 and focus on discrepancies with ground-based measurements at SGP. The CERES SARB is generated by a highly modified Fu-Liou radiative transfer code (Fu and Liou, 1993). The most critical inputs for this application are cloud optical properties (fractional area, optical depth, particle size and phase, height of top, and estimate of geometrical thickness Minnis et al., 2002) from the narrowband VIRS imager. Numerous VIRS pixels (approx. 2km resolution at nadir) are matched to each of the large (approx. 20km) CERES broadband footprints (Wielicki et al, 1996). Other inputs include temperature and humidity from ECMWF (Rabier et al, 1998) , NCEP ozone profiles from SBUV and TOVS (Yang et al, 2001), aerosol optical thickness (AOT) from the Model for Atmospheric Transport and Chemistry (MATCH) aerosol assimilation (Collins et al., 2001) or alternately from the VIRS imager (Ignatov and Stowe, 2000). VIRS AOT is available for clear and partly cloudy ocean footprints during daylight; and only when viewing geometry renders a contribution from sunglint as unlikely. For other footprints, AOT is taken from MATCH. AOT is apportioned into fractions of dust (Tegan and Lacis, 1996), sea salt, sulfate, dust, soluble organic, insoluble organic, and soot (Hess et al., 1996) using the 6-hourly MATCH output. Tuned fluxes are retrieved by adjusting inputs to nudge computed TOA fluxes toward CERES observations (Rose et al, 1997). In clear conditions, the fields of humidity, surface skin temperature, surface albedo and AOT are adjusted to produce a closer match of computed and observed fluxes at TOA. When CERES footprints have clouds, the cloud optical thickness, fractional area within the footprint, and temperature of cloud top are adjusted by the tuning algorithm. Both tuned and untuned fluxes are archived, as are the respective adjustments to any parameters at the surface or within the atmosphere.
Author
Atmospheric Radiation; Earth Radiation Budget; Radiation Measurement; Earth Surface; Clouds (Meteorology)

20070004935 NASA Langley Research Center, Hampton, VA, USA
Global, Multi-Year Analysis of Clouds and Earth's Radiant Energy System Terra Observations and Radiative Transfer Calculations
Charlock, T. P.; Rose, F. G.; Rutan, D. A.; Coleman, L. H.; Caldwell, T.; Zentz, S.; [2005]; 8 pp.; In English; 15th ARM Science Team Meeting, 14-18 Mar. 2005, Daytona Beach, FL, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 109.431.07.01; Copyright; Avail.: CASI: A02, Hardcopy

An extended record of the Terra Surface and Atmosphere Radiation Budget (SARB) computed by CERES (Clouds and Earth s Radiant Energy System) is produced in gridded form, facilitating an investigation of global scale direct aerosol forcing. The new gridded version (dubbed FSW) has a spacing of 1 at the Equator. A companion document (Rutan et al. 2005) focuses on advances to (and validation of) the ungridded, footprint scale calculations (dubbed CRS), primarily in clear-sky conditions. While mainly intended to provide observations of fluxes at the top of atmosphere (TOA), CERES (Wielicki et al. 1996) includes a program to also compute the fluxes at TOA, within the atmosphere and at the surface, and also to validate the results with independent ground based measurements (Charlock and Alberta 1996). ARM surface data has been a focus for this component of CERES. To permit the user to infer cloud forcing and direct aerosol forcing with the computed SARB, CERES includes surface and TOA fluxes that have been computed for cloud-free (clear) and aerosol free (pristine) footprints; this accounts for aerosol effects (SW scattering and absorption, and LW scattering, absorption and emission) to both clear and cloudy skies.
Derived from text
Atmospheric Radiation; Atmospheric Heat Budget; Clouds (Meteorology); Terra Spacecraft; Radiative Transfer; Earth Atmosphere

20070004938 Washington Univ., Seattle, WA, USA
Use of Weather Data to Predict Non-Recurring Traffic Congestion
Dailey, D. J.; Aug. 2006; 23 pp.; In English
Report No.(s): PB2007-103681; No Copyright; Avail.: National Technical Information Service (NTIS)

The goal of this project is to demonstrate the quantitative relationship between weather patterns and surface traffic conditions. The aviation and maritime industries use weather measurements and predictions as a normal part of operations,

and this can be extended to surface transportation. While it is generally asserted that there is a causal relationship between weather and transportation system delays, this relationship has not been quantified in a way that allows the effects on surface transportation systems to be predicted. This research has the potential to accomplish two very important things: (1) prediction of non-recurring traffic congestion and (2) prediction of conditions under which incidents or accidents can have a significant impact on the freeway system. This linkage of weather to traffic may be one of the only non-recurring congestion phenomena that can be accurately predicted. If the research is successful, it will create a report that describes an algorithm and implementation to correlate weather and traffic congestion. Furthermore, it may provide a means for traffic management to proactively place resources to clear incidents.
NTIS
Congestion; Forecasting; Traffic

20070005039 Office of Management and Budget, Washington, DC USA
Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences. Synthesis and Assessment Product 1.1
Apr. 2006; 180 pp.; In English
Report No.(s): PB2007-104306; No Copyright; Avail.: National Technical Information Service (NTIS)

A primary objective of the U. S. Climate Change Science Program (CCSP) is to provide the best possible scientific information to support public discussion and government and private sector decision-making on key climate-related issues. To help meet this objective, the CCSP has identified an initial set of 21 synthesis and assessment products that address its highest priority research, observation, and decision-support needs. This Synthesis/Assessment Report, the first of the 21 Reports, focuses on understanding the causes of the reported differences between independently produced data sets of atmospheric temperature trends from the surface through the troposphere to the lower stratosphere.
NTIS
Climate Change; Lower Atmosphere; Trends

20070005059 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions
Price, L.; de la Rue du Can, S.; Sinton, J.; Worrell, E.; Nan, Z.; January 2006; 60 pp.; In English
Report No.(s): DE2006-888753; No Copyright; Avail.: National Technical Information Service (NTIS)

In 2000, the Intergovernmental Panel on Climate Change (IPCC) published a new set of baseline greenhouse gas (GHG) emissions scenarios in the Special Report on Emissions Scenarios (SRES) (Nakicenovic et al., 2000). The SRES team defined four narrative storylines (A1, A2, B1 and B2) describing the relationships between the forces driving GHG and aerosol emissions and their evolution during the 21st century. The SRES reports emissions for each of these storylines by type of GHG and by fuel type to 2100 globally and for four world regions (OECD countries as of 1990, countries undergoing economic reform, developing countries in Asia, rest of world). Specific assumptions about the quantification of scenario drivers, such as population and economic growth, technological change, resource availability, land-use changes, and local and regional environmental policies, are also provided. End-use sector-level results for buildings, industry, or transportation or information regarding adoption of particular technologies and policies are not provided in the SRES. The goal of this report is to provide more detailed information on the SRES scenarios at the end use level including historical time series data and a decomposition of energy consumption to understand the forecast implications in terms of end use efficiency to 2030. This report focuses on the A1 (A1B) and B2 marker scenarios since they represent distinctly contrasting futures. The A1 storyline describes a future of very rapid economic growth, low population growth, and the rapid introduction of new and more efficient technologies. Major underlying themes are convergence among regions, capacity building, and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income. The B2 storyline describes a world with an emphasis on economic, social, and environmental sustainability, especially at the local and regional levels. It is a world with moderate population growth, intermediate levels of economic development, and less rapid and more diverse technological change (Nakicenovic et al., 2000). Data were obtained from the SRES modeling teams that provide more detail than that reported in the SRES. For the A1 marker scenario, the modeling team provided final energy demand and carbon dioxide (CO2) emissions by fuel for industry, buildings, and transportation for nine world regions. Final energy use and CO2 emissions for three sectors (industry, transport, buildings) for the four SRES world regions were provided for the B2 marker scenario. This report describes the results of a disaggregation of the SRES projected energy use and energy-related CO2 emissions for the industrial, transport, and buildings sectors for 10 world regions to 2030. An example of further disaggregation of the two SRES scenarios for the residential buildings sector in China is provided, illustrating how such aggregate scenarios can be interpreted at the end use level.

NTIS

Climate; Energy Consumption; Exhaust Emission; Exhaust Gases; Greenhouse Effect; Trends

20070005090 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Modeling the Observed Solar Cycle Variations of the Quasi-biennial Oscillation (QBO): Amplification by Wave Forcing

Mayr, Hans G.; Mengel, John G.; Huang, Frank T.; Chan, Kwing L.; [2007]; 16 pp.; In English; Copyright; Avail.: CASI: A03, Hardcopy

In several papers, the solar cycle (SC) effect in the lower atmosphere has been linked observationally to the Quasi-biennial Oscillation (QBO) of the zonal circulation, which is generated primarily by small-scale gravity waves (GW). Salby and Callaghan (2000) in particular analyzed the QBO, covering more than 40 years, and discovered that it contains a large SC signature at 20 km. With our Numerical Spectral Model (NSM), we conducted a 3D study to describe the QBO under the influence of the SC, and some results have been published (Mayr et al., GRL, 2005,2006). For a SC period of 10 years, the relative amplitude of radiative forcing is taken to vary exponentially with height, i.e., 0.2% at the surface, 2% at 50 km, 20% at 100 km and above. Applying spectral analysis to filter out and identify the SC signature, the model generates a relatively large modulation of the QBO, which reproduces the observations qualitatively. Our numerical results demonstrate that the modulation of the QBO, with constant phase relative to the SC, persist at least for 60 years. The same model run generates in the seasonal variations a hemispherically symmetric Equatorial Annual Oscillation (EAO, with 12-month period), which is confined to low latitudes like the QBO and is also modulated by the SC. Although the amplitude of the EAO is relatively small, its SC modulation is large, and it is in phase with that of the QBO. The SC modulated EAO is evidently the pathway and pacemaker for the solar influence on the QBO. To shed light on the dynamical processes involved, we present model results that show how the seasonal cycle induces the SC modulations of the EAO and QBO. Our analysis further demonstrates that the SC modulations of the QBO and EAO are amplified by the GW interaction with the flow. The GW momentum source clearly shows a SC modulation that is in phase with the corresponding modulations of the QBO and EAO. By tapping the momentum from the upward propagating GWs, the QBO and EAO apparently serve as conduits to amplify and transfer to lower altitudes the larger SC variations in the UV absorbed in the mesosphere. Our model also produces in the temperature variations of the QBO and EAO measurable SC modulations at polar latitudes near the tropopause, and such signatures have been reported in the literature. Contrary to conventional interpretation, however, we suggest that the effects are generated at least in part by the meridional circulation, and planetary waves presumably, which redistribute the energy from the equatorial region where wave forcing is very efficient and thereby amplifies the SC influence.

Author

Amplification; Mathematical Models; Planetary Waves; Quasi-Biennial Oscillation; Solar Cycles; Variations; Spectrum Analysis

20070005092 NASA Goddard Space Flight Center, Greenbelt, MD, USA

An Integrated High Resolution Hydrometeorological Modeling Testbed using LIS and WRF

Kumar, Sujay V.; Peters-Lidard, Christa D.; Eastman, Joseph L.; Tao, Wei-Kuo; [2007]; 28 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NASA ESTO/AIST NRA-02-OES-04; Copyright; Avail.: CASI: A03, Hardcopy

Scientists have made great strides in modeling physical processes that represent various weather and climate phenomena. Many modeling systems that represent the major earth system components (the atmosphere, land surface, and ocean) have been developed over the years. However, developing advanced Earth system applications that integrates these independently developed modeling systems have remained a daunting task due to limitations in computer hardware and software. Recently, efforts such as the Earth System Modeling Ramework (ESMF) and Assistance for Land Modeling Activities (ALMA) have focused on developing standards, guidelines, and computational support for coupling earth system model components. In this article, the development of a coupled land-atmosphere hydrometeorological modeling system that adopts these community interoperability standards, is described. The land component is represented by the Land Information System (LIS), developed by scientists at the NASA Goddard Space Flight Center. The Weather Research and Forecasting (WRF) model, a mesoscale numerical weather prediction system, is used as the atmospheric component. LIS includes several community land surface models that can be executed at spatial scales as fine as 1km. The data management capabilities in LIS enable the direct use of high resolution satellite and observation data for modeling. Similarly, WRF includes several parameterizations and schemes for modeling radiation, microphysics, PBL and other processes. Thus the integrated LIS-WRF system facilitates several

multi-model studies of land-atmosphere coupling that can be used to advance earth system studies.
Author
Numerical Weather Forecasting; Prediction Analysis Techniques; Hydrometeorology; Mesoscale Phenomena; Mesometeorology; Computer Programs; Earth Atmosphere; Earth Surface

20070005114 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Mesospheric Dynamical Changes Induced by the Solar Proton Events in October-November 2003
Jackman, Charles H.; Roble, Raymond G.; Fleming, Eric L.; [2007]; 21 pp.; In English; Copyright; Avail.: CASI: A03, Hardcopy

The very large solar storms in October-November 2003 caused solar proton events (SPEs) at the Earth that impacted the upper atmospheric polar cap regions. The Thermosphere Ionosphere Mesosphere Electrodynamic General Circulation Model (TIME-GCM) was used to study the atmospheric dynamical influence of the solar protons that occurred in Oct-Nov 2003, the fourth largest period of SPEs measured in the past 40 years. The highly energetic solar protons caused ionization, as well as dissociation processes, and ultimately produced odd hydrogen (HOx) and odd nitrogen (NOy). Significant short-lived ozone decreases (10-70%) followed these enhancements of HOx and NOy and led to a cooling of most of the lower mesosphere. This cooling caused an atmospheric circulation change that led to adiabatic heating of the upper mesosphere. Temperature changes up to plus or minus 2.6 K were computed as well as wind (zonal, meridional, vertical) perturbations up to 20-25% of the background winds as a result of 22 the solar protons. The solar proton-induced mesospheric temperature and wind perturbations diminished over a period of 4-6 weeks after the SPEs. The Joule heating in the mesosphere, induced by the solar protons, was computed to be relatively insignificant for these solar storms with most of the temperature and circulation perturbations caused by ozone depletion in the sunlit hemisphere.
Author
Mesosphere; Solar Protons; Solar Storms; Annual Variations; Atmospheric Circulation; Earth Atmosphere

20070005162 NASA Langley Research Center, Hampton, VA, USA
Uncertainty Analysis of Historical Hurricane Data
Green, Lawrence L.; [2007]; 27 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 604746.901.02.04
Report No.(s): AIAA Paper 2007-1102; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005162; Avail.: CASI: A03, Hardcopy

An analysis of variance (ANOVA) study was conducted for historical hurricane data dating back to 1851 that was obtained from the U. S. Department of Commerce National Oceanic and Atmospheric Administration (NOAA). The data set was chosen because it is a large, publicly available collection of information, exhibiting great variability which has made the forecasting of future states, from current and previous states, difficult. The availability of substantial, high-fidelity validation data, however, made for an excellent uncertainty assessment study. Several factors (independent variables) were identified from the data set, which could potentially influence the track and intensity of the storms. The values of these factors, along with the values of responses of interest (dependent variables) were extracted from the data base, and provided to a commercial software package for processing via the ANOVA technique. The primary goal of the study was to document the ANOVA modeling uncertainty and predictive errors in making predictions about hurricane location and intensity 24 to 120 hours beyond known conditions, as reported by the data set. A secondary goal was to expose the ANOVA technique to a broader community within NASA. The independent factors considered to have an influence on the hurricane track included the current and starting longitudes and latitudes (measured in degrees), and current and starting maximum sustained wind speeds (measured in knots), and the storm starting date, its current duration from its first appearance, and the current year fraction of each reading, all measured in years. The year fraction and starting date were included in order to attempt to account for long duration cyclic behaviors, such as seasonal weather patterns, and years in which the sea or atmosphere were unusually warm or cold. The effect of short duration weather patterns and ocean conditions could not be examined with the current data set. The responses analyzed were the storm latitude, longitude and intensity, as recorded in the data set, 24 or 120 hours beyond the current state. Several ANOVA modeling schemes were examined. Two forms of validation were used: 1) comparison with official hurricane prediction performance metrics and 2) cases studies conducted on hurricanes from the 2005 season, which were not included within the model construction and ANOVA assessment. In general, the ANOVA technique did not perform as well as the established official prediction performance metrics published by NOAA; still, the technique did remarkably well in this demonstration with a difficult data set and could probably be made to perform better with more knowledge of hurricane

development and dynamics applied to the problem. The technique provides a repeatable prediction process that eliminates the need for judgment in the forecast.
Author
Analysis of Variance; Hurricanes; Time Measurement; Predictions; Forecasting; Error Analysis; Independent Variables

20070005209 Washington Univ., Seattle, WA USA
Calibrated Probabilistic Mesoscale Weather Field Forecasting: The Geostatistical Output Perturbation (GOP) Method
Gel, Yulia; Raftery, Adrian E; Gneiting, Tilmann; Mar 12, 2003; 20 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-01-10745
Report No.(s): AD-A459674; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459674; Avail.: Defense Technical Information Center (DTIC)

Probabilistic weather forecasting consists of finding a joint probability distribution for future weather quantities or events. It is typically done by using a numerical weather prediction model, perturbing the inputs to the model in various ways, often depending on data assimilation, and running the model for each perturbed set of inputs. The result is then viewed as an ensemble of forecasts, taken to be a sample from the joint probability distribution of the future weather quantities of interest. This is typically not feasible for mesoscale weather prediction carried out locally by organizations without the vast data and computing resources of national weather centers. Instead, we propose a simpler method which breaks with much previous practice by perturbing the outputs, or deterministic forecasts, from the model. Forecast errors are modeled using a geostatistical model, and ensemble members are generated by simulating realizations of the geostatistical model. The method is applied to 48-hour mesoscale forecasts of temperature in the US Pacific Northwest in 2000 and 2002. The resulting forecast intervals turn out to be well calibrated for individual meteorological quantities, to be sharper than those obtained from approximate climatology, and to be consistent with aspects of the spatial correlation structure of the observations.
DTIC
Calibrating; Mesometeorology; Mesoscale Phenomena; Perturbation Theory; Probability Theory; Weather

20070005240 Washington Univ., Seattle, WA USA
Using Bayesian Model Averaging to Calibrate Forecast Ensembles
Raftery, Adrian E; Balabdaoui, Fadoua; Gneiting, Tilmann; Polakowski, Michael; Dec 15, 2003; 33 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-01-10745
Report No.(s): AD-A459828; UW-STAT-TR-440; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459828; Avail.: CASI: A03, Hardcopy

Ensembles used for probabilistic weather forecasting often exhibit a spread-skill relationship, but they tend to be underdispersive. This paper proposes a principled statistical method for postprocessing ensembles based on Bayesian model averaging (BMA), which is a standard method for combining predictive distributions from different sources. The BMA predictive probability density function (PDF) of any quantity of interest is a weighted average of PDFs centered around the individual (possibly bias-corrected) forecasts, where the weights are equal to posterior probabilities of the models generating the forecasts, and reflect the models' skill over the training period. The BMA PDF can be represented as an unweighted ensemble of any desired size, by simulating from the BMA predictive distribution. The BMA weights can be used to assess the usefulness of ensemble members, and this can be used as a basis for selecting ensemble members. The BMA predictive variance can be decomposed into two components, one corresponding to the between-forecast variability, and the second to the within-forecast variability. Predictive PDFs or intervals based solely on the ensemble spread incorporate the first component but not the second. Thus BMA provides a theoretical explanation of the tendency of ensembles to exhibit a spread-skill relationship but yet to be underdispersive. The method was applied to 48-hour forecasts of sea-level pressure in the Pacific Northwest, using the University of Washington MM5 mesoscale ensemble. The predictive PDFs were much better calibrated than the raw ensemble, the BMA forecasts were sharp in that 90% BMA prediction intervals were 62% shorter on average than those produced by sample climatology. As a byproduct, BMA yields a deterministic point forecast, and this had RMSE 11% lower than any of the ensemble members, and 6% lower than the ensemble mean. Similar results were obtained for forecasts of surface temperature.
DTIC
Bayes Theorem; Calibrating; Forecasting; Probability Density Functions

20070005242 Washington Univ., Seattle, WA USA

Calibrated Probabilistic Forecasting at the Stateline Wind Energy Center: The Regime-Switching Space-Time (RST) Method

Gneiting, Tilmann; Larson, Kristin; Westrick, Kenneth; Genton, Marc G; Aldrich, Eric; Sep 2004; 28 pp.; In English
Contract(s)/Grant(s): N00014-01-10745
Report No.(s): AD-A459831; UW-STAT-TR-464; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459831; Avail.: CASI: A03, Hardcopy

With the global proliferation of wind power, accurate short-term forecasts of wind resources at wind energy sites are becoming paramount. Regime-switching space-time (RST) models merge meteorological and statistical expertise to obtain accurate and calibrated, fully probabilistic forecasts of wind speed and wind power. The model formulation is parsimonious, yet takes account of all the salient features of wind speed: alternating atmospheric regimes, temporal and spatial correlation, diurnal and seasonal non-stationarity, conditional heteroscedasticity, and non-Gaussianity. The RST method identifies forecast regimes at the wind energy site and fits a conditional predictive model for each regime. Geographically dispersed meteorological observations in the vicinity of the wind farm are used as off-site predictors. The RST technique was applied to 2-hour ahead forecasts of hourly average wind speed at the Stateline wind farm in the US Pacific Northwest. In July 2003, for instance, the RST forecasts had root-mean-square error (RMSE) 28.6% less than the persistence forecasts. For each month in the test period, the RST forecasts had lower RMSE than forecasts using state-of-the-art vector time series techniques. The RST method provides probabilistic forecasts in the form of predictive cumulative distribution functions, and those were well calibrated and sharp. The RST prediction intervals were substantially shorter on average than prediction intervals derived from univariate time series techniques. These results suggest that quality meteorological data from sites upwind of wind farms can be efficiently used to improve short-term forecasts of wind resources. It is anticipated that the RST technique can be successfully applied at wind energy sites all over the world.

DTIC

Calibrating; Forecasting; Probability Distribution Functions; Switching; Windpower Utilization

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*.

20070003878 Army Engineer Research and Development Center, Vicksburg, MS USA

Evaluating a Prefabricated Submerged Breakwater and Double-T Sill for Beach Erosion Prevention, Cape May Point, NJ

Jan 2003; 17 pp.; In English
Report No.(s): AD-A459542; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Beaches; Breakwaters; Water Erosion; Prevention

20070004877 Army Engineer Research and Development Center, Vicksburg, MS USA

National Shoreline Erosion Control Demonstration Program Overview

Aug 2000; 5 pp.; In English
Report No.(s): AD-A459558; No Copyright; Avail.: CASI: A01, Hardcopy

No abstract available

Shorelines; Water Erosion; Erosion

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*.

20070003503 University of Southern California, Marina del Rey, CA USA

A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder

Pair, Jarrell; Allen, Brian; Dautricourt, Matthieu; Treskunov, Anton; Liewer, Matt; Graap, Ken; Reger, Greg; Rizzo, Albert; Jan 2006; 7 pp.; In English

Report No.(s): AD-A459227; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459227; Avail.: CASI: A02, Hardcopy

Post-Traumatic Stress Disorder (PTSD) is reported to be caused by traumatic events that are outside the range of usual human experiences, including (but not limited to) military combat, violent personal assault, being kidnapped or taken hostage, and terrorist attacks. Initial data suggests that 1 out of 6 Iraqi War veterans are exhibiting symptoms of depression, anxiety, and PTSD. Virtual Reality (VR) exposure treatment has been used in previous treatments of PTSD patients with reports of positive outcomes. The aim of the current paper is to present the rationale, technical specifications, application features, and user-centered design process for the development of a Virtual Iraq PTSD VR therapy application. The VR treatment environment is being created via the recycling of virtual graphic assets that were initially built for the U.S. Army-funded combat tactical simulation scenario and commercially successful X-Box game, ‘Full Spectrum Warrior,’ in addition to other available and newly created assets. Thus far, the authors have created a series of customizable virtual scenarios designed to represent relevant contexts for exposure therapy to be conducted in VR, including a city and a desert road convoy environment. User-Centered tests with the application are currently underway at the Naval Medical Center, San Diego, and within an Army Combat Stress Control Team in Iraq, with clinical trials scheduled to commence in February 2006.

DTIC

Combat; Exposure; Injuries; Iraq; Psychotherapy; Simulation; Therapy; Virtual Reality; Warfare

20070003532 NASA Ames Research Center, Moffett Field, CA, USA

Application of NASA’s Advanced Life Support Technologies in Polar Regions

Bubenheim, David L.; [1997]; 1 pp.; In English; Alaska Water and Wastewater Management Association Research Development Conference on Rural Sanitation, 22 Apr. 1997, Fairbanks, AK, USA; No Copyright; Avail.: Other Sources; Abstract Only

The problems of obtaining adequate pure drinking water and disposing of liquid and solid waste in the U.S Arctic, a region where virtually all water is frozen solid for much of the year, has led to unsanitary solutions. Sanitation and a safe water supply are particularly problems in rural villages. These villages are without running water and use plastic buckets for toilets. The outbreak of diseases is believed to be partially attributable to exposure to human waste and lack of sanitation. Villages with the most frequent outbreaks of disease are those in which running water is difficult to obtain. Waste is emptied into open lagoons, rivers, or onto the sea coast. It does not degrade rapidly and in addition to affecting human health, can be harmful to the fragile ecology of the Arctic and the indigenous wildlife and fish populations. Current practices for waste management and sanitation pose serious human hazards as well as threaten the environment. NASA’s unique knowledge of water/wastewater treatment systems for extreme environments, identified in the Congressional Office of Technology Assessment report entitled An Alaskan Challenge: Native Villagt Sanitation, may offer practical solutions addressing the issues of safe drinking water and effective sanitation practices in rural villages. NASA’s advanced life support technologies are being combined with Arctic science and engineering knowledge to address the unique needs of the remote communities of Alaska through the Advanced Life Systems for Extreme Environments (ALSEE) project. ALSEE is a collaborative effort involving the NASA, the State of Alaska, the University of Alaska, the North Slope Borough of Alaska, Ilisagvik College in Barrow and the National Science Foundation (NSF). The focus is a major issue in the State of Alaska and other areas of the Circumpolar North; the health and welfare of its people, their lives and the subsistence lifestyle in remote communities, economic opportunity, and care for the environment. As advanced technologies are transferred to the commercial sector the ALSEE project Offers the potential for development of new industries in Alaska to supply the products to support remote communities of the globe.

Author

Polar Regions; Life Support Systems; Technology Assessment; Biological Hazards

20070003555 Long Island Jewish Medical Center, Lake Success, NY USA
Neural Protein Synuclein (SNCG) in Breast Cancer Progression
Aug 2005; 11 pp.; In English
Contract(s)/Grant(s): DAMD17-01-1-0352
Report No.(s): AD-A459728; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Breast; Cancer; Proteins; Life Sciences

20070003559 Howard Univ., Washington, DC USA
A Training Program in Breast Cancer Research Using NMR Techniques
Jul 2006; 86 pp.; In English
Contract(s)/Grant(s): DAMD17-00-1-0291
Report No.(s): AD-A459727; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Breast; Cancer; Education; Nuclear Magnetic Resonance

20070003563 NASA Ames Research Center, Moffett Field, CA, USA
Bucky Paper as a Support Membrane in Retinal Cell Transplantation
Loftus, David J., Inventor; Leng, Theodore, Inventor; Huie, Philip, Inventor; Fishman, Harvey, Inventor; November 14, 2006; 7 pp.; In English; Original contains black and white illustrations
Patent Info.: Filed 4 Sep. 2002; US-Patent-7,135,172; US-Patent-Appl-SN-238515; NASA-Case-ARC-14940-1; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003563; Avail.: CASI: A02, Hardcopy

A method for repairing a retinal system of an eye, using bucky paper on which a plurality of retina pigment epithelial cells and/or iris pigment epithelial cells and/or stem cells is deposited, either randomly or in a selected cell pattern. The cell-covered bucky paper is positioned in a sub-retinal space to transfer cells to this space and thereby restore the retina to its normal functioning, where retinal damage or degeneration, such as macular degeneration, has occurred.
Official Gazette of the U.S. Patent and Trademark Office

Membranes; Retina; Stem Cells; Transplantation; Cell Membranes (Biology)

20070003639 Army Medical Research and Materiel Command, Fort Detrick, MD USA
Showcase for Biotechnology 2005
Nov 2006; 25 pp.; In English
Contract(s)/Grant(s): W81XWH-05-1-0541
Report No.(s): AD-A459725; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Biotechnology; Life Sciences

20070003640 Children's Hospital, Boston, MA USA
Mouse Model of Human Breast Cancer Initiated by a Fusion Oncogene
Sep 2006; 14 pp.; In English
Contract(s)/Grant(s): W81XWH-05-1-0502
Report No.(s): AD-A459723; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Breast; Cancer; Mice; Oncogenes; Models

20070003641 California Univ., San Diego, CA USA
Glycopetide-Based Immunotherapy for Prophylaxis and Treatment of Mammary Adenocarcinomas
Jun 2006; 25 pp.; In English
Contract(s)/Grant(s): DAMD17-02-1-0436
Report No.(s): AD-A459722; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Mammary Glands; Prophylaxis; Peptides; Immunology; Therapy; Cancer

20070003642 Massachusetts Inst. of Tech., Cambridge, MA USA
Are Anti-Inflammatory Lymphocytes Able to Induce Remission of Breast Cancer
Aug 2006; 17 pp.; In English
Contract(s)/Grant(s): W81XWH-05-1-0460
Report No.(s): AD-A459721; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Breast; Cancer; Lymphocytes

20070003661 Oregon Univ., Portland, OR USA
The Role of CRELD1 Isoform 9b in the Pathogenesis of Breast Cancer
Oct 2006; 7 pp.; In English
Contract(s)/Grant(s): W81XWH-04-1-0634
Report No.(s): AD-A459720; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Breast; Cancer; Pathogenesis; Life Sciences

20070003662 Connecticut Univ., Storrs, CT USA
Monitoring Cancer Oxygenation Changes Induced by Ultrasound
Jun 2006; 8 pp.; In English
Contract(s)/Grant(s): DAMD17-02-1-0358
Report No.(s): AD-A459719; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Cancer; Oxygenation; Ultrasonics; Life Sciences

20070003663 Georgetown Univ., Washington, DC USA
Gene Environment Interactions in Women With Breast and Secondary Lung Cancer
Jul 2006; 52 pp.; In English
Contract(s)/Grant(s): DAMD17-03-1-0300
Report No.(s): AD-A459717; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available

Breast; Cancer; Females; Lungs; Genes

20070003664 Howard Univ., Washington, DC USA
Computer-Aided Detection of Mammographic Masses in Dense Breast Images
Jun 2006; 56 pp.; In English
Contract(s)/Grant(s): DAMD17-03-1-0314
Report No.(s): AD-A459716; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Breast; Computer Techniques; Images; Detection

20070003665 Mount Sinai School of Medicine, New York, NY USA
Increasing Breast Cancer Surveillance Among African American Breast Cancer Survivors
Jul 2006; 27 pp.; In English
Contract(s)/Grant(s): DAMD17-03-1-0454
Report No.(s): AD-A459715; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Breast; Cancer; Surveillance; Race Factors; Africa; Life Span

20070003667 Mount Sinai School of Medicine, New York, NY USA
Restoration of Epithelial Polarity in Metastatic Tumors
Jul 2006; 6 pp.; In English
Contract(s)/Grant(s): W81XWH-05-1-0475
Report No.(s): AD-A459714; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Metastasis; Polarity; Restoration; Tumors; Epithelium

20070003668 West Virginia Univ., Morgantown, WV USA
Exercise and Bone Density: Meta-Analysis
Oct 2005; 10 pp.; In English
Contract(s)/Grant(s): DAMD17-98-1-8513
Report No.(s): AD-A459713; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Bones; Physical Exercise; Density Measurement; Life Sciences

20070003669 Mount Sinai School of Medicine, New York, NY USA
Bone Geometry as a Predictor of Tissue Fragility and Stress Fracture Risk
Oct 2006; 76 pp.; In English
Contract(s)/Grant(s): DAMD17-001-1-0806
Report No.(s): AD-A459711; No Copyright; Avail.: CASI: A05, Hardcopy

No abstract available

Bones; Risk; Tissues (Biology); Cracking (Fracturing); Stress (Biology)

20070003722 NASA Johnson Space Center, Houston, TX, USA
Locomotor Dysfunction after Spaceflight: Characterization and Countermeasure Development
Mulavara, A. P.; Cohen, H. S.; Peters, B. T.; Miller, C. A.; Brady, R.; Bloomberg, Jacob J.; [2007]; 2 pp.; In English; 24th Annual Houston Conference on Biomedical, 8-9 Feb. 2007, Houston, TX, USA
Contract(s)/Grant(s): NCC9-58; Copyright; Avail.: CASI: A01, Hardcopy

Astronauts returning from space flight show disturbances in locomotor control manifested by changes in various sub-systems including head-trunk coordination, dynamic visual acuity, lower limb muscle activation patterning and kinematics (Glasauer, et al., 1995; Bloomberg, et al., 1997; McDonald, et al., 1996; 1997; Layne, et al., 1997; 1998, 2001, 2004; Newman, et al., 1997; Bloomberg and Mulavara, 2003). These post flight changes in locomotor performance, due to neural adaptation to the microgravity conditions of space flight, affect the ability of crewmembers especially after a long duration mission to egress their vehicle and perform extravehicular activities soon after landing on Earth or following a landing on the surface of the Moon or Mars. At present, no operational training intervention is available pre- or in- flight to mitigate post flight locomotor disturbances. Our laboratory is currently developing a gait adaptability training program that is designed to facilitate recovery of locomotor function following a return to a gravitational environment. The training program exploits the ability of the sensorimotor system to generalize from exposure to multiple adaptive challenges during training so that the gait control system essentially 'learns to learn' and therefore can reorganize more rapidly when faced with a novel adaptive challenge. Ultimately, the functional goal of an adaptive generalization countermeasure is not necessarily to immediately return movement patterns back to 'normal'. Rather the training regimen should facilitate the reorganization of available sensorimotor sub-systems to achieve safe and effective locomotion as soon as possible after space flight. We have previously confirmed that subjects participating in adaptive generalization training programs, using a variety of visuomotor distortions and different motor tasks from throwing to negotiating an obstacle course as the dependent measure, can learn to enhance their ability to adapt to a novel sensorimotor environment (Roller et al., 2001; Cohen et al. 2005). Importantly, this increased adaptability is retained even one month after completion of the training period. Our laboratory is currently developing adaptive generalization training procedures and the associated flight hardware to implement such a training program, using variations of visual flow, subject loading, and treadmill speed; during regular in-flight treadmill operations.

Author

Locomotion; Coordination; Extravehicular Activity; Flight Characteristics; Psychomotor Performance; Muscular Function

20070003836 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA
The Oligodendrocyte Progenitor Response to Demyelination
Vana, Adam C; Jan 2006; 119 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459050; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459050; Avail.: CASI: A06, Hardcopy

In multiple sclerosis (MS), demyelination results in impaired axon conduction and functional deficits. Remyelination is often observed early in the MS disease course, but over time becomes limited. The general belief is that remyelination requires robust oligodendrocyte progenitor (OP) amplification prior to remyelination. With MS being a chronic disease we were interested in the responses that occurred following chronic demyelination. Studies using the chronic cuprizone model of

demyelination display limited remyelination, a depleted pool of OPs, and decreased oligodendrocytes. We now show that after chronic demyelination apoptosis continues even after cessation of cuprizone to evaluate means to promote remyelination. Overexpression of platelet-derived growth factor-A (PDGF-A) was tested with chronic cuprizone demyelination in hPDGF-A transgenic (tg) mice. Remyelination was improved in hPDGF-A tg mice during recovery after chronic demyelination. OP density and proliferation increased only transiently in hPDGF-A tg mice during acute demyelination but not during chronic demyelination or recovery. Importantly, hPDGF-A tg mice had increased oligodendrocyte regeneration associated with reduced apoptosis during recovery. The effect of increased PDGF-A is likely as a survival factor during the regeneration of oligodendrocytes and remyelination, as preventing apoptosis of oligodendrocytes may be important not only during acute demyelination but also during chronic demyelination. Overall, we found that following demyelination Myt1 may have a potential role in the regeneration of oligodendrocyte lineage cells, whereas the overexpression of PDGF-A appears to enhance survival of newly differentiated myelinating oligodendrocytes.
DTIC
Axons; Diseases; Oligomers

20070003840 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA
Spatial-Temporal Mapping of the T Cell Receptor NF-kappaB Signaling Pathway
Rossman, Jeremy S; May 30, 2006; 131 pp.; In English; Original contains color illustrations
Report No.(s): AD-A458940; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA458940; Avail.: CASI: A07, Hardcopy

T lymphocytes are critical mediators of adaptive immunity that recognize antigen through the T cell receptor (TCR). Stimulation of the TCR leads to a complex signal transduction cascade resulting in the activation of the transcription factors NFAT, AP-1 and NF-kappaB. The activation of these transcription factors is a crucial step in T lymphocyte activation. TCR stimulation results in the spatial redistribution of several proteins involved in signal transduction to NF-kappaB. We find that the signaling intermediate Bcl10 forms cytoplasmic oligomers, called POLKADOTS, upon antigen stimulation. The formation of these structures requires the interaction between Bcl10 and MALT1 and is correlated with the activation of NF-kappaB. Our research shows that POLKADOTS are foci for functional interactions between signaling intermediates in TCR-mediated activation of NF-kappaB. In addition to forming POLKADOTS in the cytoplasm in response to antigen signals, a significant portion of cellular Bcl10 localizes to the nucleus in the steady state. Observations of high enrichment of Bcl10 in the nucleus of MALT lymphoma tumor cells suggest that Bcl10 nuclear localization may be actively regulated by signaling processes. Aberrant redistribution of Bcl10 to the nucleus in MALT lymphomas may contribute to tumorigenesis or pathogenesis. We show that Bcl10 is found in the nucleus of T lymphocytes, that this localization is regulated by PKCtheta, and that dose-dependent interactions with MALT1 mediate the nuclear export of Bcl10. We also show that the N-terminus of Bcl10 is essential for NF-kappaB activation, possibly by functioning as a transcriptional enhancer for NF-kappaB-responsive genes. These results may further suggest a pathogenic role for nuclear localization of Bcl10 in MALT lymphomas. In summary, through spatial-temporal analysis of Bcl10 subcellular localization and protein-protein interactions, we have further elucidated the role played by Bcl10 in health and in disease.
DTIC
Lymphocytes; Cells (Biology); Antigens; Genetics

20070003855 Library of Congress, Washington, DC USA
The National Biodefense Analysis and Countermeasures Center: Issues for Congress
Shea, Dana A; Nov 21, 2006; 19 pp.; In English
Report No.(s): AD-A459125; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459125; Avail.: CASI: A03, Hardcopy

The mission of the National Biodefense Analysis and Countermeasures Center (NBACC) is to understand current and future biological threats; assess vulnerabilities and determine potential consequences; and provide a national capability for conducting forensic analysis of evidence from bio-crimes and bio-terrorism. The NBACC is operational, with a program office and several component centers occupying interim facilities. A laboratory facility dedicated to executing the NBACC mission and to contain two NBACC component centers is being built at Fort Detrick, Maryland, as part of the National Interagency Biodefense Campus. The laboratory facility, with an estimated construction cost of $141 million, will be the first Department of Homeland Security laboratory specifically focused on biodefense. Its programmatic contents and component organization appear to be evolving, as conflicting information has been provided during previous budget cycles.
DTIC
Countermeasures; Security; Warfare; Biological Weapons

20070004577 North Shore-Long Island Jewish Research Inst., Manhasset, NY USA

Anti-HMGB1 Antibodies and Alpha-7 Agonists as Experimental Therapeutics as BW Countermeasures

Nov 10, 2006; 4 pp.; In English

Contract(s)/Grant(s): W911NF-05-1-0323

Report No.(s): AD-A459623; 500302; No Copyright; Avail.: CASI: A01, Hardcopy

No abstract available

Antibodies; Countermeasures

20070004663 Florida Univ., Gainesville, FL USA

Silanols, a New Class of Antimicrobial Agent

Apr 2006; 17 pp.; In English

Contract(s)/Grant(s): F08637-02-C-7021; Proj-ARMT

Report No.(s): AD-A459762; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Antibiotics; Antiinfectives and Antibacterials; Microorganisms

20070004665 British Columbia Univ., Vancouver, British Columbia Canada

A Phase I/II Study of Combination Neoadjuvant Hormone Therapy and Weekly OGX-011 Prior to Radical Prostatectomy in Patients with Localized Prostate Cancer

Aug 2006; 22 pp.; In English

Contract(s)/Grant(s): DAMD17-02-1-0226

Report No.(s): AD-A459756; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Cancer; Prostate Gland; Therapy

20070004680 Nebraska Univ., Omaha, NE USA

Role of Estrogen Metabolism in the Initiation of Prostate Cancer: Biomarkers of Susceptibility and Early Detection

May 2006; 13 pp.; In English

Contract(s)/Grant(s): DAMD17-02-1-0660

Report No.(s): AD-A459745; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Prostate Gland; Biomarkers; Detection

20070004684 Johns Hopkins Univ., Baltimore, MD USA

HOXB7: An Oncogenic Gene in Breast Cancer

May 2006; 19 pp.; In English

Contract(s)/Grant(s): DAND17002-1-0426

Report No.(s): AD-A459744; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Cancer; Breast; Carcinogens; Tumors

20070004687 Texas Univ., Houston, TX USA

The Role of C-SRC Activation in Prostate Tumor Progression

Jul 2006; 27 pp.; In English

Contract(s)/Grant(s): DAMD17-03-1-0484

Report No.(s): AD-A459743; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Prostate Gland; Tumors

20070004700 Nebraska Univ., Omaha, NE USA
Characterization of Genetic Modifiers of Estrogen-Induced Mammary Cancer
Jul 2006; 10 pp.; In English
Contract(s)/Grant(s): DAMD17-03-1-0477
Report No.(s): AD-A459737; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Cancer; Mammary Glands; Genetics; Estrogens

20070004702 State Univ. of New York, Stony Brook, NY USA
Enhancing Bone Accretion Using Short Duration, Low-Level Mechanical Vibrations
Oct 2005; 7 pp.; In English
Contract(s)/Grant(s): DAMD17-03-10777
Report No.(s): AD-A459736; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Bones; Vibration; Deposition

20070004734 Virginia Commonwealth Univ., Richmond, VA USA
Lysophosphatidic Acid Regulation and Roles in Human Prostate Cancer
Aug 2006; 78 pp.; In English
Contract(s)/Grant(s): DAMD17-02-1-0060
Report No.(s): AD-A459786; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Cancer; Prostate Gland; Acids

20070004739 Texas Univ., Houston, TX USA
Molecular Mechanism by Which Retinoids Prevent Breast Cancer Development
Jun 1, 2006; 37 pp.; In English
Contract(s)/Grant(s): W81XWH-04-1-0505
Report No.(s): AD-A459784; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Breast; Cancer; Carotenoids

20070004741 Dartmouth Coll., Hanover, NH USA
Three Dimensional Reconstruction Algorithm for Imaging Pathophysiological Signals Within Breast Tissue Using Near Infrared Light
Jul 2006; 129 pp.; In English
Contract(s)/Grant(s): DAMD17-03-1-0405
Report No.(s): AD-A459783; No Copyright; Avail.: CASI: A07, Hardcopy

No abstract available

Algorithms; Imaging Techniques; Breast; Near Infrared Radiation

20070004743 Indiana Univ., Bloomington, IN USA
Role of the Neddylation Enzyme Uba3, A New Estrogen Receptor Corepressor in Breast Cancer
Sep 2006; 131 pp.; In English
Contract(s)/Grant(s): DAMD17-02-1-0418
Report No.(s): AD-A459782; No Copyright; Avail.: CASI: A07, Hardcopy

No abstract available

Breast; Cancer; Enzymes; Estrogens

20070004761 Georgia Inst. of Tech., Atlanta, GA USA

Silica-Immobilized Enzyme Reactors; Application to Cholinesterase-Inhibition Studies

Mar 2006; 10 pp.; In English

Contract(s)/Grant(s): F08637-03-C-6006; Proj-4915

Report No.(s): AD-A459775; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Cholinesterase; Enzymes; Silicon Dioxide

20070004780 NASA Johnson Space Center, Houston, TX, USA

A Hypothetical Perspective on the Relative Contributions of Strategic and Adaptive Control Mechanisms in Plastic Recalibration of Locomotor Heading Direction

Richards, J. T.; Mulavara, A. P.; Ruttley, T.; Peters, B. T.; Warren, L. E.; Bloomberg, J. J.; [2006]; 2 pp.; In English; Seventh Symposium on the Role of the Vestibular, 7-9 Jun. 2006, Noordwijk, Netherlands

Contract(s)/Grant(s): NCC9-58; Copyright; Avail.: CASI: A01, Hardcopy

We have previously shown that viewing simulated rotary self-motion during treadmill locomotion causes adaptive modification of the control of position and trajectory during over-ground locomotion, which functionally reflects adaptive changes in the sensorimotor integration of visual, vestibular, and proprioceptive cues (Mulavara et al., 2005). The objective of this study was to investigate how strategic changes in torso control during exposure to simulated rotary self-motion during treadmill walking influences adaptive modification of locomotor heading direction during over-ground stepping.

Author

Locomotion; Treadmills; Computerized Simulation; Adaptive Control; Plastics; Calibrating

20070004782 NASA Marshall Space Flight Center, Huntsville, AL, USA

Trichococcus Patagoniensis sp. nov., a Facultative Anaerobe that grows at -5 C, Isolated from Penguin Guano in Chilean Patagonia

Pikuta, Elena V.; Hoover, Richard B.; Bej, Asim K.; Marsic, Damien; Whitman, William B.; Krader, Paul E.; Tang, Jane; International Journal of Systematic and Evolutionary Microbiology; 2006; Volume 56, pp. 2055-2062; In English; Original contains black and white illustrations; Copyright; Avail.: Other Sources

A novel, extremely psychrotolerant, facultative anaerobe, strain PmagGl(sup T), was isolated from guano of Magellanic penguins (Spheniscus magellanicus) collected in Chilean Patagonia. Gram-variable, motile cocci with a diameter of 1.3-2.0 micrometers were observed singularly or in pairs, short chains and irregular conglomerates. Growth occurred within the pH range 6.0-10.0, with optimum growth at pH 8.5. The temperature range for growth of the novel isolate was from -5 to 35 C, with optimum growth at 28-30 C. Strain PmagG1(sup T) did not require NaCl, as growth was observed in the presence of 0-6.5% NaCl with optimum growth at 0.5% (w/v). Strain PmagGl(sup T) was a catalase-negative chemo-organoheterotroph that used sugars and some organic acids as substrates. The metabolic end products were lactate, formate, acetate, ethanol and Con. Strain PmagG1(sup T) was sensitive to ampicillin, tetracycline, chloramphenicol, rifampicin, kanamycin and gentamicin. The G+C content of its genomic DNA was 45.8 mol%. 16S rRNA gene sequence analysis showed 100 % similarity of strain PmagG1(sup T) with Trichococcus collinsii ATCC BAA-296(sup T), but DNA-DNA hybridization between them demonstrated relatedness values of less than 45 plus or minus 1%. Another phylogenetically closely related species, Trichococcus pasteurii, showed 99.85 % similarity by 16s rRNA sequencing and DNA-DNA hybridization showed relatedness values of 47 plus or minus 1.5%. Based on genotypic and phenotypic characteristics, the novel species Trichococcus patagoniensis sp. nov. is proposed, with strain PmagG1(sup T) (=ATCC BAA-756(sup T)=JCM 12176(sup T)=CIP 108035(sup T)) as the type strain.

Author

Anaerobes; Mesophiles; Genome; Chile

20070004784 NASA Johnson Space Center, Houston, TX, USA

Natural Calcium Isotopic Composition of Urine as a Marker of Bone Mineral Balance

Skulan, Joseph; Bullen, Thomas; Puzas, J. Edward; Shackelfod, Linda; LeBlanc, Adrian; Smith, Scott M.; [2007]; 18 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): HIH-P30-ES-01247-24; Copyright; Avail.: CASI: A03, Hardcopy

This study tests whether changes in the natural (that is, tracer-less) isotopic composition of calcium in human urine track changes in net bone mineral balance, as predicted by a model of calcium isotopic behavior in vertebrates. If so, isotopic

analysis of natural urine or blood calcium could be used to monitor short-term changes in bone mineral balance that cannot be detected with other techniques.
Author
Bones; Minerals; Urine; Biomarkers; Calcium Isotopes; Bone Mineral Content; Mathematical Models

20070004785 NASA Johnson Space Center, Houston, TX, USA
An Optimization of Pulsed ElectroMagnetic Fields Study
Goodwin, Thomas J.; [2006]; 99999 pp.; In English; Orthofix Basic Science Summit, 7-8 Dec. 2006, Philadelphia, PA, USA; No Copyright; Avail.: Other Sources; Abstract Only

To date, in our research we have focused on the use of normal human neuronal progenitor (NHNP) cells because of their importance in human nervous system regeneration, development and maintenance, but we have developed 2-D and 3-D bioreactors that can accommodate any cell line. In this Project, we will include the use of tissues important for physiological regeneration: Human osteoblasts or chondrocytes, and vascular cells. Our initial results with the NHNP cells were quite startling using extremely low-level electromagnetic fields (5 microtesla at 10Hz; 6mA). The low-amplitude, rapidly time-varying electromagnetic fields exert a very potent effect on the proliferation, morphology, and gene expression of the cells in culture, both in standard 2-dimensional culture plates as well as cells organized into 3-dimensional tissue-like assemblies (TLAs) in a 3D bioreactor. We have replicated our preliminary results many, many times, have analyzed the gene expression using gene arrays (followed by Luminex analysis for protein production), and have monitored cell proliferation, orientation, morphology, and glucose metabolism, and we are confident that we have a stable and reliable model to study the control of high-level cellular processes by application of low-amplitude, time varying electromagnetic fields (TVEMF) (1, 2). In additional studies at the University of Michigan, we have been able to generate functional in vitro engineered mammalian skeletal muscle, and have employed nerve-muscle co-culture techniques to promote axonal sprouting. We believe that nearly all tissues, in particular, neural, are susceptible to the influences of low-level TVEMF.
Author
Regeneration (Physiology); Tissues (Biology); Optimization; Electromagnetic Fields; Bioreactors; Pulsed Radiation

20070004816 Texas A&M Univ., College Station, TX USA
Making Lipid Membranes Rough, Tough, and Ready to Hit the Road
Jul 2006; 6 pp.; In English
Contract(s)/Grant(s): W911NF-05-1-0494; FA9550-06-C-0006
Report No.(s): AD-A459504; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available
Lipids; Life Sciences; Cell Membranes (Biology)

20070004821 Monell Chemical Senses Center, Philadelphia, PA USA
Speed-Accuracy Tradeoff in Olfaction
Aug 2, 2006; 13 pp.; In English
Contract(s)/Grant(s): DAAD19-03-1-0224
Report No.(s): AD-A459510; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Olfactory Perception; Odors; Psychophysiology

20070004904 Rand Arroyo Center, Santa Monica, CA USA
Implementation of the Diabetes Practice Guideline in the Army Medical Department: Final Evaluation
Jan 2005; 177 pp.; In English
Contract(s)/Grant(s): DASW01-01-C-0003
Report No.(s): AD-A459485; MG-277; No Copyright; Avail.: CASI: A09, Hardcopy

No abstract available
Metabolic Diseases; Military Operations; Diabetes Mellitus; Evaluation; Medical Services

20070004907 New Mexico Univ., Albuquerque, NM USA

Effect of Palm Cooling with Negative Pressure on Heat Balance During Exercise in a Hot, Dry Environment

Nov 15, 2006; 78 pp.; In English

Contract(s)/Grant(s): W911NF-06-1-0025

Report No.(s): AD-A459500; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

High Temperature Environments; Physical Exercise; Cooling; Heat Balance

20070005108 NASA Johnson Space Center, Houston, TX, USA

Effects of Speed and Visual-Target Distance on Toe Trajectory During the Swing Phase of Treadmill Walking

Miller, Christopher A.; Feiveson, Al; Bloomberg, Jacob J.; [2007]; 29 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): NCC9-58; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005108; Avail.: CASI: A03, Hardcopy

Toe trajectory during swing phase is a precise motor control task that can provide insights into the sensorimotor control of the legs. The purpose of this study was to determine changes in vertical toe trajectory during treadmill walking due to changes in walking speed and target distance. For each trial, subjects walked on a treadmill at one of five speeds while performing a dynamic visual acuity task at either a far or near target distance (five speeds two targets distances = ten trials). Toe clearance decreased with increasing speed, and the vertical toe peak just before heel strike increased with increasing speed, regardless of target distance. The vertical toe peak just after toe-off was lower during near-target visual acuity tasks than during far-target tasks, but was not affected by speed. The ankle of the swing leg appeared to be the main joint angle that significantly affected all three toe trajectory events. The foot angle of the swing leg significantly affected toe clearance and the toe peak just before heel strike. These results will be used to enhance the analysis of lower limb kinematics during the sensorimotor treadmill testing, where differing speeds and/or visual target distances may be used.

Author

Psychomotor Performance; Trajectories; Treadmills; Visual Acuity; Walking; Feet (Anatomy); Body Kinematics; Velocity

20070005253 Baylor Coll. of Medicine, Houston, TX USA

The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer

Kwabi-Addo, Bernard; Wang, Jianghua; Erdem, Halime; Vaid, Ajula; Castro, Patricia; Ayala, Gustavo; Ittmann, Michael; Jul 15, 2004; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-01-1-0021; P50CA058204

Report No.(s): AD-A459849; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459849; Avail.: CASI: A02, Hardcopy

A considerable body of evidence indicates that alterations of fibroblast growth factors (FGFs) and their receptors contribute to prostate cancer progression. Recently, a new family of regulators of FGF activity has been identified. The Sprouty gene family negatively regulates FGF signaling in a variety of systems and could potentially limit the biological activity of FGFs in prostate cancer. Immunohistochemical analysis of normal and neoplastic prostate tissues using tissue microarrays revealed that Sprouty1 protein is down-regulated in approximately 40% of prostate cancers when compared with matched normal prostate. By quantitative real-time PCR analysis, we found that Sprouty1 mRNA levels were significantly decreased in prostate cancers in vivo in comparison with normal prostate. In prostate cancer cell lines, there is loss of the normal upregulation of Sprouty1 mRNA and protein in response to FGFs. The decrease in Sprouty1 expression in the human prostate cancer, despite elevated levels of FGF ligands and FGF receptors, implies a loss of an important growth regulatory mechanism in prostate cancers that may potentiate the effects of increased FGF and FGF receptor expression in prostate cancer.

DTIC

Cancer; Fibroblasts; Genes; Genetics; Inhibitors; Prostate Gland; Transferring

20070005257 Utah Univ., Salt Lake City, UT USA

Using Genetically Engineered Mice to Probe the Role of Bioactive Lipids in Prostate Carcinogenesis

Stafforini, Diana M; Jul 2006; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0135

Report No.(s): AD-A459858; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459858; Avail.: CASI: A02, Hardcopy

Prostate cancer (PCa) is the most common malignancy in North American men and represents the second most common cause of cancer death. PCa is characterized by many different stages including very aggressive forms that disseminates to bone, lymph nodes, and other tissues. Tumors release factors that attract and activate cells of the immune system including macrophages. In some tumors, macrophages can both stimulate and inhibit cancer growth and proliferation. One of the changes that take place when macrophages are exposed to specific stimuli is the transcriptional activation of a gene encoding a phospholipase A2, platelet-activating factor acetylhydrolase (PAF-AH) that has anti-inflammatory properties owing to its ability to hydrolyze a large group of bioactive lipids. The levels of PAF-AH are dramatically increased in PCa compared to normal prostate tissues; the source is likely macrophages recruited to PCa sites. We are testing the hypothesis is that elevated PAF-AH derived from macrophages recruited to PCa sites alters the rate of PCa progression using both in vivo and in vitro methodologies. We have successfully generated PAF-AH-deficient mice in a model of PCa (the TRAMP transgenic model) that recapitulates many salient aspects of human PCa. We are analyzing how deficiency of PAF-AH modulates PCa progression in vivo. In addition, we have used cellular approaches to establish that members of the PAF signaling axis promote growth of PCa cells and that overexpression of PAF-AH decreases cellular proliferation either by inhibiting cell division or by promoting apoptosis.
DTIC
Cancer; Carcinogens; Genes; Lipids; Mice; Prostate Gland

20070005259 Pittsburgh Univ., Pittsburgh, PA USA
Annual Safar Symposium (3rd) Held at University of Pittsburgh School of Medicine on 23 June 2005
Kochanek, Patrick M; Jul 2005; 11 pp.; In English
Contract(s)/Grant(s): W81XWH-05-C-0143
Report No.(s): AD-A459860; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459860; Avail.: CASI: A03, Hardcopy

This grant funded expenses related to the third Safar Symposium held at the University of Pittsburgh School of Medicine on June 23, 2005. This symposium is held each year in honor of the late Dr. Peter Safar, pioneer of CPR, resuscitation, critical care, and disaster medicine. The symposium focused on two aspects of medical research of importance to the field of resuscitation medicine in its broadest scope, namely, a morning session entitled The Inflammatory Response in Resuscitation and an afternoon session on Advances in Human Simulation Education. The symposium featured 10 speakers and was well received by over 200 attendees, including physicians, scientists, medical residents, fellows, and students, nurses, paramedics, and other allied professionals in the field of resuscitation medicine. The Symposium was linked to the annual Peter and Eva Safar Lecture for the Sciences and Humanities at the University of Pittsburgh School of Medicine along with the first clinical consortium of trauma investigators (both civilian and military) focused on a potential clinical trial of a novel resuscitation approach to traumatic arrest called Emergency Preservation and Resuscitation.
DTIC
Conferences; Resuscitation

20070005262 Virginia Univ., Charlottesville, VA USA
Nuclear Imaging for Assessment of Prostate Cancer Gene Therapy
Pan, Dongfeng; Apr 2006; 12 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-02-1-0261
Report No.(s): AD-A459865; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459865; Avail.: CASI: A03, Hardcopy

Background: Combination of the cytotoxic viral thymidine kinase (tk) and the prodrug, acyclovir (ACV) has been reported to inhibit the growth of the C4-2 tumor, a subline of LNCaP. However, it remains unsolved to non-invasively detect the in vivo distribution, expression and persistence of the toxic gene as well as to evaluate the therapeutic effect. In this project, we will develop a nuclear gene imaging approach to assist the cytotoxic gene therapy study for prostate cancer. Objective/Hypothesis: The distribution, expression, and persistence of the prostate specific Ad-PSA-tk in the C4-2 tumor xenograft model will be noninvasively and repeatedly determined in vivo by tracing the radiolabeled TK substrates with a SPECT imaging modality. Specific Aim of the first year: To synthesize a radiolabeled TK substrate, 2 -Deoxy-2 fluoro-5-{3-oxo[N,N-bis(2- mercaptoethyl)ethylenediaminato][Tc-99m] technetium(V)-1(E)-propenyl}uridine, for TK detection using a small animal gamma detector. Progress and outcome: In last report of 2003 which covers from September of 2002 to March of 2003, we reported our efforts to synthesize fragments A and B. In this report we successfully linked the radiometal chelator with fluorothymidine. We will characterize the structure of the final tracer and test the pharmacokinetics and pharmacodynamics of the tracer in next research year. Also, the Adenoviral vectors with reporter genes of tk and luciferase

were constructed. The luciferase gene expression in live mouse model was non-invasively imaged and the result was posted in 2003 Annual Meeting of ASGT (American Society of Gene Therapy).
DTIC
Cancer; Diseases; Gene Therapy; Genetics; Imaging Techniques; Prostate Gland

20070005264 Wayne State Univ., Detroit, MI USA
Lymphedema Prophylaxis Utilizing Perioperative Education
Kosir, Mary A; Sep 2006; 23 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-00-1-0495
Report No.(s): AD-A459869; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459869; Avail.: CASI: A03, Hardcopy

The purpose is to evaluate perioperative training for lymphedema assessment and protection. The hypothesis is that structured perioperative training in lymphedema protection will decrease lymphedema, the episodes of infection, the time to detection of lymphedema and improve the QOL in patients undergoing axillary dissection and/or radiation therapy for breast cancer as compared to a control group. The specific questions (scope) are 1) what is the incidence of lymphedema and infection during the first three years after surgery among breast cancer patients who received perioperative training in lymphedema protection as compared to a control group? 2) What are the differences in the measured QOL among breast cancer patients during the first three years after surgery that received perioperative education in lymphedema protection as compared to a control group? 3) What are the retention of information on lymphedema protection, and the compliance with arm precautions among breast cancer patients who received perioperative lymphedema training as compared to a control group? Major Findings: The incidence of lymphedema was 60.1% with a majority occurring within the first year after surgery. Teaching LE protection methods did not reduce the incidence of LE nor improve QOL except at 24 months for those with LE. Those with LE also had increased knowledge of LE protection methods as compared to a control group but only significant at 6 months associated with a booster session. Significance: The LE rate is greater than reported in the literature primarily because prospective measurements were obtained including the first year after surgery when a majority of cases were observed. Other factors that may impact the occurrence of LE without regard to knowledge of protection measures include impaired lymphatic healing after surgery, persistence of activity despite knowing it may cause harm to the extremity, and uncontrolled hypertension which may increase the risk for LE.
DTIC
Education; Health; Infectious Diseases; Lymphatic System; Prophylaxis

20070005269 Army Medical Dept. Center and School, Fort Sam Houston, TX USA
Foundations in the Law: Classic Cases in Medical Ethics
Zucker, K W; Allen, Tracy L; Boyle, Martin J; Burton, Amy R; Smyth, Vito S; Jan 2007; 287 pp.; In English
Report No.(s): AD-A459875; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459875; Avail.: CASI: A13, Hardcopy

The ethics of a people, as demonstrated through public policy, are generally thought to inform that people's legal system and its decisions. The converse is also true: decisions within a legal system inform, or impact, ethics -specifically medical ethics The cases discussed in this paper are at the foundation of medical ethics in the USA. They address informed consent, abortion, refusal of medical care, the right to die, surrogate motherhood, and medical research, among other topics. Cases unique to the military are also included. This monograph includes significant excerpts from 25 cases. The excerpts include those portions of the decisions that address the most important ethical issues. Appendices include the USA Constitution, the vocabulary of medical ethics, a chronological list of cases, cases grouped by subject, a table of all cited cases, and biographies of the editors.
DTIC
Ethics; Law (Jurisprudence); Medical Science; Medical Services; Policies

20070005284 Ottawa Univ., Ontario Canada
Dietary Heterocyclic Amines and Polymorphic Variants in the Etiology of Prostate Cancer
Birkett, Nicholas; Jan 2006; 62 pp.; In English
Contract(s)/Grant(s): W81XWH-05-1-0148
Report No.(s): AD-A459895; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459895; Avail.: CASI: A04, Hardcopy

This project is exploring the hypothesis that higher intake of dietary heterocyclic amines is associated with elevated risk of prostate cancer. It is also exploring the potential that polymorphic variation in key metabolism genes may affect risk. The project is using epidemiological method to conduct a case-control study. Progress through-out the first year has been to finalize methods, hire and train staff and finalize field work procedures. Pilot testing of the proposed methods has been completed. The main field for the project will begin in 2006, once final ethics approval has been received.
DTIC
Amines; Cancer; Diets; Epidemiology; Etiology; Heterocyclic Compounds; Metabolism; Polymorphism; Prostate Gland

20070005285 Colorado Univ., Boulder, CO USA
Identification of the Downstream Promoter Targets of Smad Tumor Suppressors in Human Breast Cancer Cells
Liu, Xuedong; Jul 1, 2006; 13 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-02-1-0350
Report No.(s): AD-A459896; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459896; Avail.: CASI: A03, Hardcopy

Members of TGF-beta superfamily ligands are potent regulators of cell proliferation, differentiation and animal development. The biological effects of these ligands are mediated mainly through activation of the Smad family protein which serves as transcription factors to regulate gene expression. We analyzed the cis-regulatory elements that are responsible for conveying TGF-BETA/Activin responses at the genomic levels. Activin A and TGF-BETA transcriptional responses in immortalized normal human mammary epithelial cells were examined by gene expression profiling and computational analysis the regulatory regions of TGFbeta- responsive genes using a new algorithm, which is based on frequency of occurrence, and cross-species conservation. Our analysis revealed that a distinct set of cis-regulatory elements conserved across species is either unique or over-represented in TGF-BETA-regulated genes. A set of bioinformatics tools were developed for browsing promoters in mammalian cells.
DTIC
Breast; Cancer; Genetics; Mammary Glands; Suppressors; Targets; Tumors

20070005286 California Univ., Berkeley, CA USA
Simulation of Biomolecular Nanomechanical Systems
Chakraborty, Arup K; Majumdar, Arunava; Oct 2006; 34 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-01-2-0540; Proj-E117
Report No.(s): AD-A459897; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459897; Avail.: CASI: A03, Hardcopy

This report documents results from the BioNEMS project. Computer simulation methods and theoretical tools that can be applied to guide the design of microdevices relying on the concept of translating biomolecular binding to mechanical forces were developed. These computational tools were applied, in synergy with experiments, to define the important factors that determine device performance. One important result is that molecular-level self assembly of probe molecules determines microdevice performance, and this has had a big impact on the design of cantilever-based microdevices. These findings were used to establish design guidelines and utilized in the fabrication of a prototype device that is being transitioned in to a commercial product. Efforts to translate mechanical signals to electronic ones are also described in this context. New discoveries regarding how T lymphocytes of the immune system detect pathogens can be exploited to create synthetic pathogen detectors that exhibit extraordinary sensitivity and selectivity were examined. Computer simulations exploring T cell signaling were completed as part of this research.
DTIC
Biochemistry; Biological Effects; Biomimetics; Computerized Simulation; Detection; Detectors; Microelectromechanical Systems; Pathogens; Simulation

20070005287 Army Research Inst. of Environmental Medicine, Natick, MA USA
Validation of a Shortened Electronic Version of the Environmental Symptoms Questionnaire
Beidleman, Beth A; Muza, Stephen R; Fulco, Charles S; Rock, Paul B; Cymerman, Allen; Nov 2006; 18 pp.; In English
Report No.(s): AD-A459898; USARIEM-T07-03; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459898; Avail.: CASI: A03, Hardcopy

Acute Mountain Sickness (AMS) is a syndrome that is characterized by headache, insomnia, anorexia, nausea, dizziness, and fatigue, but without abnormal neurological findings (11, 22). The severity and incidence of AMS is primarily related to

the initial altitude, the rate of ascent, the altitude reached, and the duration of exposure to altitude (9, 13, 16, 21, 30). Additional factors that affect the severity and incidence of AMS are the degree of hyperemia (2, 5, 10, 18), level of physical exertion performed (8, 24), individual susceptibility (25, 31), and degree of prior altitude acclimatization (12, 15). Symptoms of AMS typically become evident in the first few hours of altitude exposure and reach peak severity in 24 to 48 h (22). The chief significance of AMS is that people rapidly exposed to altitude may be completely incapacitated in the first few days at altitude (22). Additionally, in a few individuals, AMS may progress to life-threatening high-altitude cerebral edema or high-altitude pulmonary edema, where evacuation is required.
DTIC
Altitude Sickness; Signs and Symptoms

20070005291 Stanford Univ., Stanford, CA USA
Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics
Santiago, Juan G; Sundaram, Shankar; Krishnamoorthy, S; Przekwas, Andrzej J; Meinhart, Carl; Myszka, David G; Ricco, Antonia; Boone, Travis; Knio, Omar; Najm, Habib; Oct 2006; 156 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-00-2-0609; DARPA ORDER-J406; Proj-E117
Report No.(s): AD-A459906; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459906; Avail.: CASI: A08, Hardcopy

The goal of this project was the development of novel on-chip assay devices and modeling capabilities to enable optimized design processes and create new methods to realize robust, field-portable microfluidic devices. The team developed, validated and commercialized new multiphysics models to the Bio-electro-mechanical systems (MEMS) community (over 50 organizations) through CFD-ACE+. The team further developed rapid (e.g., 1000x faster) biokinetics data extraction methods for antibody assays; and discovered and created models for an electrokinetic instability and used it to create 1000x faster a micromixer. The team developed a novel on-chip assay device that combines isoelectric focusing and electrophoresis to achieve a 2D assay in 1/30th of the time of a traditional system. Lastly, the team developed a method that achieved 1100x fold on-chip electrophoretic sample preconcentration which lead to an additional task focused on developing rapid sample pre-concentration methods to improve on-chip assay. The team developed new codes for eletrokinetic convective-diffusion assays with fast reaction kinetics capability. The team experimentally demonstrated million-fold sample concentration increase (three orders of magnitude improvement), using optimized isotachophoresis.
DTIC
Assaying; Data Bases; Fluidics; Microelectromechanical Systems

20070005294 Duke Univ., Durham, NC USA
Miniature and Molecularly Specific Optical Screening Technologies for Breast Cancer
Ramanujam, Nimmi; Oct 2006; 21 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-05-1-0363
Report No.(s): AD-A459910; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459910; Avail.: CASI: A03, Hardcopy

The goal of this proposal is to harness the power of light to create ‘miniature and molecularly specific optical technologies’ for breast cancer diagnosis and detection. The miniature technologies will leverage on millimeter scale silicon detectors and LEDs to make compact devices that can be used in a practical clinical setting for breast cancer detection. The features that will be exploited for optical detection/diagnosis of breast cancer will include the physiological, structural and molecular alterations that accompany the transformation of a cell from a normal to malignant state.
DTIC
Breast; Cancer; Mammary Glands; Miniaturization; Silicon

20070005314 RAND Corp., Santa Monica, CA USA
Implementation of the Asthma Practice Guideline in the Army Medical Department: Evaluation of Process and Effects
Farley, Donna O; Cretin, Shan; Vernez, Georges; Pieklik, Suzanne; Quiter, Elaine; Ashwood, J S; Tu, Wenli; Jan 2005; 213 pp.; In English
Contract(s)/Grant(s): DASW01-01-C-0003
Report No.(s): AD-A459958; RAND/MG-319; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459958; Avail.: Defense Technical Information Center (DTIC)

The Army Medical Department (AMEDD) has made a commitment to establishing a structure and process to support its military treatment facilities (MTFs) in implementing evidence-based practice guidelines with the goal of achieving best practices that reduce variation and enhance quality of medical care. The Quality Management Directorate of the Army Medical Command (MEDCOM) contracted with RAND to work as a partner in the development and testing of guideline implementation methods for ultimate application to an Army-wide guideline program. Three practice guideline demonstrations were fielded over a two-year period, in each of which participating Army MTFs implemented a different clinical practice guideline. All the demonstrations worked with practice guidelines that were established collaboratively by the Department of Veterans Affairs (VA) and Department of Defense (DoD).
DTIC
Asthma; Medical Services; Military Operations

20070005315 Pennsylvania Univ., Philadelphia, PA USA
Modeling, Analysis, Simulation, and Synthesis of Biomolecular Networks
Ruben, Harvey; Kumar, Vijay; Sokolsky, Oleg; Oct 2006; 18 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-01-2-0563; Proj-BIOC
Report No.(s): AD-A459959; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459959; Avail.: CASI: A03, Hardcopy

This project under the DARPA BIOCOMP program integrated fundamental scientific investigations in the field of molecular systems biology, algorithm development for biomolecular modeling, and open source, object based software implementation. Major accomplishments were 1) experimental gene knockout strain investigations of the V.fisheri quorum sensing system that yielded a mathematical model of its regulatory proteins, 2) a model of stringent response in E.coli and M.tuberculosis describing the role of enzyme RelMtb, 3) a first example of reachability analysis applied to a biomolecular system (lactose induction), 4) a model of tetracycline resistance that discriminates between two possible mechanisms for tetracycline diffusion through the cell membrane, and 5) a new method for investigating the producibility of a metabolite by a network of chemical reactions from an available set of nutrients using sets of gene knockouts. Accomplishments in algorithm/implementation were 1) reachability and other metabolic analysis tools for non-linear biomolecular networks aiding construction of a hybrid systems-based abstraction, 2) a Systems Biology Markup Language compatible reachability algorithm using a piecewise multi-affine hybrid system method, and 3) a metabolic network producibility analysis algorithm for large scale metabolic networks predicting the possibility of producing a set of metabolites from a set of available nutrients, complementing biomass flux optimization.
DTIC
Algorithms; Biosynthesis; Mathematical Models; Molecular Biology; Network Analysis; Networks; Simulation

20070005319 Scripps Research Inst., La Jolla, CA USA
Novel Angiogenic Domains: Use in Identifying Unique Transforming and Tumor Promoting Pathways in Human Breast Cancer
Deuel, Thomas F; Oct 2004; 72 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-00-1-0151
Report No.(s): AD-A459964; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459964; Avail.: CASI: A04, Hardcopy

Breast cancers in humans often grow slowly or even remain undetectable for long periods of time only to reappear in discreet stages as progressively more malignant tumors. Recently studies in both human cancers and experimental cancers in animals have established that cancers become progressively more aggressive in incremental steps that result from genetic mutations or ′switches’ in the tumor cells themselves. We have found that the two growth/differentiation promoting cytokines pleiotrophin (PTN) and midkine (MK) act as ‘switches’ when introduced into breast cancer cells to stimulate more aggressive growth and induce new intratumor blood vessel formation, ie, an ‘angiogenic switch.’ Different studies have found constitutive expression of either the PTN or MK genes in over 50% of human breast cancers, suggesting our data is very important and relevant to human breast cancer. We now plan to pursue the mechanism of PTN signaling in both MMTV driven pleiotrophin gain of function mice and ‘knock-out’ pleiotrophin mice developed in the laboratory and the mechanisms of downstream PIN signaling with different ‘chip technology’-driven strategies available to us in the laboratory.
DTIC
Angiogenesis; Breast; Cancer; Identifying; Mammary Glands; Tumors

20070005357 Naval Medical Research Center, Silver Spring, MD USA

Enhancing the Immunogenicity of a Dengue-2 DNA Vaccine with Adjuvants and Anti-Fc(gamma)RI Antibodies

Porter, Kevin R; Wu, Shuenn-Jue; Raviprakash, Kanakatte; Oct 2004; 15 pp.; In English
Contract(s)/Grant(s): MIPR-1LCCDDM1149
Report No.(s): AD-A460036; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460036; Avail.: CASI: A03, Hardcopy

The objective is to use adjuvants to enhance the immunogenicity of a dengue (DEN) DNA vaccine. The adjuvants to be evaluated in this project include aluminum phosphate, tetanus toxoid and anti-Fc(gamma)R monoclonal antibodies chemically linked to the DNA vaccine. Multiple attempts to link the anti-Fc(gamma)R monoclonal antibody to the DNA vaccine resulted in a poor efficiency in the linkage reaction using thiol linkage chemistry. An alternative approach using hydrazine and aldehyde linkage methods is currently being pursued. Experiments were initiated to evaluate the ability of tetanus toxoid (TT) to enhance the immunogenicity of the DEN DNA vaccine. The antibody responses to the vaccine given IM were enhanced slightly by combining it with TT. However, the ELISA and neutralizing doses of the vaccine given by Biojector, TT appeared to have an inhibitory effect. Aluminum Phosphate was demonstrated to slightly enhance anti-dengue neutralizing antibody responses, only when the DNA vaccine was given ID at suboptimal doses. There was essentially no effect when the vaccine was administered IM.

DTIC

Antibodies; Deoxyribonucleic Acid; Infectious Diseases; Vaccines

20070005358 Rockefeller Univ., New York, NY USA

Rational Design of Regulators of Programmed Cell Death in Human Breast Cancer

Cowburn, David; Jul 2003; 24 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-99-1-9362
Report No.(s): AD-A460041; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460041; Avail.: CASI: A03, Hardcopy

The BH3 motif of the pro-survival family of proteins, BCL, is also present in pro-apoptotic proteins like BID and BAX. Homo and hetero-oligomerization interactions of the BH3 motif are generally recognized as the critical component of their apoptotic activities. In full length BID, the putative hydrophobic binding surface of its BH3 motif is substantially occluded by intramolecular contacts, many of which are removed on BID’s transformation to tBID by cleavage with caspase 8, required for tBID s proapoptotic action on mitochondria, thereby releasing cytochrome c. As a step to more complete characterization of the hetero-oligomeric complexes of BID and BCL family molecules, we report here the formation of a tight complex of the BH3 motif sequence of BID with BCL-XL. In contrast to the previously reported of BAK BH3 motif with BCL-XL,the BID BH3 peptide (PDSESQEEIMHNIARKLAQIGDDI) forms an -helix significantly extended to the N-terminus, as monitored by 15N {1H} nOe determination, and by 13C chemical shifts. Modeling the BID BH3 motif/ BCL-XL on the basis of the previous structure shows the extended helix well fitted to an extended cavity in BCL-XL. Mutagenesis of the peptide and of BCL-XL on the basis of this model identified the key residues in the BH3 motif, but suggests that some conformational flexibility is likely in the BCL surface.

DTIC

Apoptosis; Breast; Cancer; Mammary Glands; Regulators

20070005363 Army Research Inst. of Environmental Medicine, Natick, MA USA

Software Tool for Analysis of Variance of DNA Microarray Data

Khatri, Purvesh; Chen, Dechang; Reifman, Jaques; Lilly, Craig M; Sonna, Larry A; Dec 2006; 89 pp.; In English
Report No.(s): AD-A460048; T07-05; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460048; Avail.: CASI: A05, Hardcopy

This report describes a software tool for two-way analysis of variance(ANOVA) with repeated measures on one factor for use in a multitude of problems, including the analysis of Affymetrix GeneChip TM microarry data. The proposed software has been used to analyze more than 22,000 probe sequences in less than 1 minute. The tool is entirely written in Java and as a result, is platform-independent. The current implementation of the tool only allows for one-way and two-way ANOVA. However, the internal data structure is designed to be able to hold data for multi-way ANOVA. The output is written to a tab-delimited test file and, accordingly, the tool can be easily extended to save the results directly into a relational database.

DTIC

Analysis of Variance; Computer Programs; Deoxyribonucleic Acid; Software Development Tools

20070005368 Fox Chase Cancer Center, Philadelphia, PA USA

Facilitating Treatment Decision Making, Adjustment, and Coping in Men Newly Diagnosed with Prostate Cancer. Addendum

Diefenbach, Michael A; Miller, Suzanne M; May 2005; 7 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-01-1-0006
Report No.(s): AD-A459866; No Copyright; Avail.: CASI: A02, Hardcopy

This study evaluated the efficacy of a patient-spouse centered cognitive-affective counseling session (CARE: cognitive-affective reactions and expectations), to facilitate treatment decision-making for localized prostate cancer (PrCa). Methods: CARE identified treatment-related values and goals and focused on improving knowledge about treatment options. A time and attention matched General Health Information (GHI) session provided nutrition information. Couples (N=300) were enrolled after diagnosis with PrCa, but before a definite treatment decision was made. Data were assessed separately for patients and spouses at baseline, at 6-months, and at 12 months post intervention. Results: Both sessions were well accepted among participants. The goal of CARE to facilitate treatment decision making was best achieved for spouses and among those patient/partners who chose a non-invasive treatment option. Partners were more distressed about the treatment decision compared to patients, especially in the CARE condition and when considering invasive procedures. We interpret this result as an indication that participants in CARE processed the relevant information and that momentarily higher levels of distress were the cost of such processing. At 6-mo this effect disappears, underscoring its temporal nature. Conclusions: The results demonstrate the usefulness of integrating a brief counseling session into the decision-making process, and that increases in perceived difficulty of decision-making are short-term.

DTIC

Cancer; Decision Making; Human Beings; Males; Prostate Gland

20070005370 Air Force Research Lab., Tyndall AFB, FL USA

Evolution of Catabolic Pathways for Synthetic Compounds Bacterial Pathways for Degradation of 2,4-dinitrotoluene and Nitrobenzene

Johnson, Glenn R; Spain, Jim C; May 15, 2003; 15 pp.; In English
Contract(s)/Grant(s): F08637-98-C-6002; Proj-2312
Report No.(s): AD-A460007; No Copyright; Avail.: CASI: A03, Hardcopy

The pathways for 2,4-dinitrotoluene (2,4-DNT) and nitrobenzene offer fine illustrations of how the ability to assimilate new carbon sources evolves in bacteria. Studies of the degradation pathways provide insight about two principal strategies for overcoming the metabolic block imposed by nitro- substituents on aromatic compounds. The 2,4-DNT pathway uses novel oxygenases for oxidative denitration and subsequent ring-fission. The nitrobenzene pathway links facile reduction of the nitro-substituent, a novel mutase enzyme, and a conserved operon encoding aminophenol degradation for mineralization of nitrobenzene. Molecular genetic analyis with comparative biochemistry reveals how the pathways were assembled in response to the recent appearance of the two synthetic chemicals in the biosphere.

DTIC

Bacteria; Biochemistry; Catabolism; Degradation; Explosives; Metabolism; Nitrobenzenes

20070005375 Army Medical Research Inst. of Infectious Diseases, Fort Detrick, MD USA

Fully Virulent Bacillus Anthracis Does Not Require the Immunodominant Protein BclA for Pathogenesis

Bozue, J; Cote, C K; Moody, L; Welkos, S L; Oct 20, 2006; 5 pp.; In English
Report No.(s): AD-A460050; TR-06-092; No Copyright; Avail.: CASI: A01, Hardcopy

The BclA protein is the immunodominant epitope on the surface of Bacillus anthracis spores; however, its roles in pathogenesis are unclear. We constructed a BclA deletion mutant (bclA) of the fully virulent Ames strain. This derivative retained full virulence in several small animal models of infection despite the bclA deletion.

DTIC

Bacillus; Infectious Diseases; Pathogenesis; Proteins

20070005379 Army Medical Research Inst. of Infectious Diseases, Fort Detrick, MD USA

Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis

Scorpio, Angelo; Chabot, Donald J; Day, William A; O'Brien, David K; Vietri, Nicholas J; Itoh, Yoshifumi; Mohamadzadeh, Mansour; Friedlander, Arthur; Oct 14, 2006; 9 pp.; In English
Report No.(s): AD-A460058; TR-06-005; No Copyright; Avail.: CASI: A02, Hardcopy

The poly gamma-D-glutamic acid capsule confers antiphagocytic properties on Bacillus anthracis and is essential for virulence. In this study, we showed that two recombinant glutamylases: CapD, a gamma-polyglutamic acid depolymerase encoded on the B. anthracis capsule plasmid, and PghP, a gamma-polyglutamic acid hydrolase encoded by bacteriophage Phi, NIT1, degraded purified capsule and removed the capsule from the surface of anthrax bacilli. Treatment with CapD or PghP induced macrophage phagocytosis of encapsulated B. anthracis. Additionally, enzyme treatment enabled human neutrophils to kill encapsulated organisms. The levels of both phagocytosis and killing corresponded to the degree of capsule degradation; CapD was more effective than PghP.
DTIC
Bacillus; Bacteriophages; Degradation; Enzymes; Glutamates; Infectious Diseases; Leukocytes

20070005382 Pennsylvania Univ., Philadelphia, PA USA
Effect of Chimaerins, Novel Receptors for Phorbol Esters, on Breast Cancer Cell Proliferation and Cell Cycle Progression
Yang, Chengfeng; Kazanietz, Marcelo G; Jul 2006; 46 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-03-1-0469
Report No.(s): AD-A460064; No Copyright; Avail.: CASI: A03, Hardcopy

Chimaerins are a family of intracellular receptors for the phorbol ester tumor promoters and the second messenger diacylglycerol. The discovery of chimaerins challenges the traditional view that protein kinase C is the only family of receptors for phorbol esters. This proposal was designed to investigate the biological functions of chimaerins. We found that (1) the mRNA levels of beta2-chimaerin, one of the most widely expressed chimaerin isoforms, were significantly lower in breast cancer cells and tissues than that in breast normal cells and tissues; (2) re-expression of beta2-chimaerin or its catalytical domain beta-GAP using an adenoviral gene delivery technique induced cell cycle arrest at G1 phase and subsequently inhibited breast cancer cell proliferation; (3) the effect of beta2- chimaerin on cell cycle progression and cell proliferation entirely depended on its Rac-GAP activity; (4) heregulin beta1 (HRG), an EGF-like growth factor and a mitogen for breast cancer cells, is a strong activator of Rac in breast cancer cells and promotes breast cancer cell proliferation through ErbB receptors/PI3K/Rac/Erk-dependent up-regulation of cyclin D1 and p21 expression; (5) expression of beta2-chimaerin inhibited HRG-induced Rac activation and impaired Rac-dependent responses including cell migration, Erk1/2 activation, cyclin D1 and p21 expression, and cell proliferation. These findings suggest that beta2-chimaerin may act as a tumor suppressor.
DTIC
Breast; Cancer; Cells (Biology); Enzymes; Esters; Mammary Glands; Phosphorus; Regeneration (Physiology); Ribonucleic Acids; Suppressors

20070005383 Louisiana State Univ., Baton Rouge, LA USA
Weight Measurements and Standards for Soldiers
Williamson, Donald A; Stewart, Tiffany; Ryan, Donna H; Newton, Jr , Robert; Martin, Corby; Bathalon, Gaston; Sigrist, Lori; Oct 1, 2006; 14 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-05-2-0082
Report No.(s): AD-A460067; No Copyright; Avail.: CASI: A03, Hardcopy

The purpose of this three-year study is to: 1) implement a computerized database to track the fatness and physical performance of Reservists assigned to the 94th RRC and 804th Medical Brigade; 2) provide the 94th RRC and 804th Medical Brigade with an environmental/internet-based intervention to increase health risk communication and promote healthy body weight/fatness and physical performance; 3) monitor the fatness and physical performance of the Reservists for two years following a one-year baseline period to evaluate the efficacy of the intervention; and 4) evaluate consumer satisfaction with the intervention.
DTIC
Body Weight; Lipids; Military Personnel; Weight Measurement

20070005384 Johns Hopkins Univ., Baltimore, MD USA
Antineoplastic Efficacy of Novel Polyamine Analogues in Human Breast Cancer
Huang, Yi; Jun 2006; 47 pp.; In English
Contract(s)/Grant(s): DAMD17-03-1-00376
Report No.(s): AD-A460069; No Copyright; Avail.: CASI: A03, Hardcopy

The critical role of polyamines in cell growth has led to the development of a number of agents that interfere with

polyamine metabolism including a novel class of polyamine analogues, oligoamines. This proposal was designed to elucidate the molecular mechanisms and the therapeutic efficacy of oligoamines in treatment of human breast cancer. In the third year of this award, we demonstrated that oligoamines specifically suppress the expression of estrogen receptor (ER) and its target genes. Further analysis demonstrated that oligoamines disrupted the DNA binding activity of Sp1 transcription factors to an ER minimal promoter element containing GC/CA rich boxes. Treatment of tumor cells with the JNK specific inhibitor SP600125, or expression of the c-Jun dominant negative inhibitor, TAM67, blocked the oligoamineactivated JNK/c-Jun pathway and enhanced oligoamine-inhibited ER expression, suggesting that AP-1 is a positive regulator of ER expression and that oligoamine activated JNK/AP-1 activity may antagonize the down-regulation of ER induced by oligoamines. These results suggest a novel antiestrogenic mechanism for specific polyamine analogues in human breast cancer cells.
DTIC
Analogs; Breast; Cancer; Mammary Glands

20070005386 Boston Univ., Boston, MA USA
The Role of AhR in Breast Cancer Development
Yang, Xinhai; Jul 2006; 16 pp.; In English
Contract(s)/Grant(s): DAMD17-03-1-0406
Report No.(s): AD-A460071; No Copyright; Avail.: CASI: A03, Hardcopy

The aryl hydrocarbon receptor (AhR) is an environmental carcinogen-activated transcription factor associated with tumorigenesis. Little is known of the transcriptional consequences of constitutive AhR activation. The effects of constitutively active and environmental ligand-induced AhR on c-myc, an oncogene, were investigated. Results indicate that: (1) the AhR constitutively binds the c-myc promoter; (2) there is a low but significant baseline level of c-myc promoter activity, which is not regulated by NF-kappaB and is not affected by an environmental AhR ligand; (3) deletion of any one of the AhREs has no effect on constitutive reporter activity, while deletion of all six increases reporter activity approximately fivefold; (4) a similar increase in reporter activity occurs when constitutively active AhR is suppressed by transfection with an AhR repressor plasmid (AhRR); (5) AhRR transfection significantly increases background levels of endogenous c-myc mRNA and c-Myc protein. These results suggest that the AhR influences the expression of c-Myc, a protein critical to malignant transformation.
DTIC
Breast; Cancer; Mammary Glands

20070005388 Health Research, Inc., Buffalo, NY USA
Prostate Derived Ets Factor, an Immunogenic Breast Cancer Antigen
Sood, Ashwani; Sep 2006; 6 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-05-1-0524
Report No.(s): AD-A460073; No Copyright; Avail.: CASI: A02, Hardcopy

The goal of the proposed research was to test the following concept. Due to prostate restricted expression of Pse in normal tissues of mice, Pse is likely to be immunogenic in female mice. T cell responses of male and female mice to Pse and a control antigen Her-2/neu were compared. Two different assays were used for this purpose; the ELISPOT assay and the Cytotoxicity assay. To date, we have found that in the FVB strain of mice immunization with Pse induces specific T cell responses in female mice but not in male mice. In contrast, Her-2/neu is immunogenic in both female and male mice. These results are novel and significant and they support our concept and suggest that PDEF (the human homologue of Pse) is likely to be similarly immunogenic in female breast cancer patients. Our results also suggest that lack of immunogenicity of Pse in male mice is likely due to some mechanism of tolerance to a self protein since Pse/PDEF is strongly expressed in the normal prostate tissue of males.
DTIC
Antigens; Breast; Cancer; Females; Mammary Glands; Mice; Prostate Gland

20070005389 Florida Univ., Gainesville, FL USA
Central Leptin Gene Therapy to Reduce Breast Cancer Risk Factors
Iwaniec, Urzula T; Wronski, Thomas J; Mar 2006; 8 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-04-1-0701
Report No.(s): AD-A460074; No Copyright; Avail.: CASI: A02, Hardcopy

Obesity is a risk factor for breast cancer, especially in postmenopausal women. Explanations for this association include increased production of estrogenic compounds due to aromatization of androgens to estrone in adipose tissue, and increased

production of serum hormones/cytokines identified as promoters of breast tumor formation and growth. The long-term goal of the proposed research is to determine if control of obesity through centrally administered, recombinant adeno-associated virus leptin gene (rAAV-lep) therapy will decrease the incidence of mammary tumor formation, progression, or metastasis in the rat model. Leptin functions as a messenger in a feedback loop between adipose tissue and the hypothalamus and contributes to the regulation of energy intake, energy expenditure, and adaptation to starvation. The objective of this research was to determine whether central rAAV-lep gene therapy will cause a decrease in serum levels of positive risk factors for breast cancer. The results show that central leptin gene therapy is effective in preventing age-related weight gain in adult rats. We also show that the gene therapy is effective in decreasing circulating levels of several breast cancer risk factors, including leptin, insulin, and IGF-I. The results indicate that increasing hypothalamic leptin to control weight has the added benefit of reducing breast cancer risk factors.
DTIC
Breast; Cancer; Estrogens; Gene Therapy; Hormones; Insulin; Mammary Glands; Obesity; Risk

20070005390 University of Southern Illinois, Springfield, IL USA
Dysregulation of RNA Interference in Breast Cancer
Mo, Yin-Yuan; Jul 2006; 20 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-05-1-0471
Report No.(s): AD-A460075; No Copyright; Avail.: CASI: A03, Hardcopy

The newly discovered RNA interference is a novel type of gene regulation mechanism, which is required for normal expression of genes. This study tests the hypothesis that breast tumor carries dysregulated RNA interference pathways, and thus, some tumor suppressor genes will be down-regulated while other genes (e.g., oncogenes) will be up-regulated, leading to tumor cell proliferation and survival. Using real time RT-PCR, we demonstrate that microRNA-21 is overexpressed in breast tumors compared to the matched normal breast tissue. Furthermore, we show that antisense oligonucleotide against microRNA-21 can suppress the endogenous microRNA-21 and causes tumor cell growth inhibition. Experiments with a xenograft carcinoma mouse model reveal that the antisense microRNA-21 oligonucleotide also inhibits tumor growth. Therefore, microRNA-21 is a potential therapeutic target for breast cancer therapy.
DTIC
Breast; Cancer; Mammary Glands; Ribonucleic Acids

20070005391 Battelle Columbus Labs., OH USA
A Medical Research and Evaluation Facility (MREF) and Studies Supporting the Medical Chemical Defense Program
Olson, Carl T; Casillas, Robert P; Jun 2006; 9 pp.; In English
Contract(s)/Grant(s): W81XWH-05-D-0001
Report No.(s): AD-A460077; No Copyright; Avail.: CASI: A02, Hardcopy

Under Task Order 0001 the MREF's laboratories and facilities were maintained and operated in compliance with government regulations. The MREF successfully passed all inspections and certifications. Major contract activities performed include: conducting inventories of CA and maintaining usage reports preparing seven Test Execution Plans (TEP) for task orders and scientific meetings with DoD Team representatives to develop current and projected tasks. A TEP was prepared for Task Order 0002 to support government testing of Skin Exposure Reduction Paste Against Chemical Warfare Agents (SERPACWA). Task Order 0003 is for performance of toxicity testing of MMB-4 dimethanesulfonate (MMB-4 DMS). Task Order 0004 is to compare cutaneous sulfur mustard injuries with thermal burns in a weanling pig models and Task Order 0005 is to use this model to determine efficacy of Epitram-B in improving healing of superficial dermal sulfur mustard injuries. Task Order 0006 is an in vitro study to investigate skin penetration of a non-traditional agent (NTA). Task Order 0007 is for toxicity testing of 4-pyridinealdoxime.
DTIC
Chemical Defense; Chemical Warfare; Defense Program; Medical Science

20070005394 Winston-Salem State Univ., Winston-Salem, NC USA
Breast Cancer Prevention by Inducing Apoptosis in DCIS Using Breast Ductal Lavage
Koty, Patrick P; Sep 2006; 9 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-02-1-0683
Report No.(s): AD-A460080; No Copyright; Avail.: CASI: A02, Hardcopy

Current prevention focuses on oral administration of chemopreventive agents which decreases breast cancer incidence but

increases the risk for secondary treatment-induced disease. In addition, these chemopreventive agents may not be effective in preventing those lesions that are estrogen receptor (ER) negative. We hypothesize that programmed cell death is dysregulated in premalignant breast cells which permits these cells to avoid cell death. We are currently investigating whether treating premalignant breast cells with a molecular genetic-based agent may be effective alone or in concert with tamoxifen treatment to induce cell death in both ER-positive and ER-negative cells. Our preliminary studies indicate a DCIS primary explant cell line overexpresses the anti-apoptotic proteins Bcl-2 and Bcl-xL compared to normal breast tissue. Our initial studies also show an increase in programmed cell death in the DCIS primary explant cell line after treatment with an antisense bcl-2/bcl-xl and/or tamoxifen. Ultimately, we envision delivering genetic-based preventive agents and/or a chemopreventive agent directly to the breast ductal lobe of these high risks eliminating any potential for secondary treatment-induced disease.
DTIC
Apoptosis; Breast; Cancer; Chemotherapy; Health; Mammary Glands; Prevention

20070005407 Armed Forces Radiobiology Research Inst., Bethesda, MD USA
Toxicological Evaluation of Depleted Uranium in Rats: Six-Month Evaluation Point
Pellmar, T C; Hogan, J B; Benson, K A; Landauer, M R; Feb 1998; 30 pp.; In English
Contract(s)/Grant(s): 95MM5530
Report No.(s): AD-A460097; AFFRI-SP-98-1; No Copyright; Avail.: CASI: A03, Hardcopy

The use of depleted uranium (DU) munitions during Desert Storm resulted in a unique type of battlefield casualty, DU shrapnel wounds. The toxicity associated with embedded DU may differ significantly from other metals or other routes of uranium administration. This is a 6-month interim report of an 18- month study that is designed to assess the toxicity of implanted DU pellets. This study evaluates kidney, behavioral, and neural toxicity associated with intramuscularly implanted DU pellets (1-mm x 2-mm) and assesses tissues for histological changes and for uranium content. Rats were assigned to five experimental groups: 1) a non-implanted sham-surgical control group, 2) rats implanted with 20 tantalum (Ta) to control for fragment implantation, 3) rats implanted with low-dose DU (4 DU and 16 Ta pellets), 4) rats implanted with medium-dose DU (10 DU and 10 Ta pellets), and 5) rats implanted with high-dose DU (20 DU pellets). Uranium levels were high and dose-dependent in the kidney, urine, and bone. Despite high uranium levels in the kidney, no renal toxicity was evident. Between 23-26 weeks body weight in high-DU dose animals was significantly lower than controls. Unexpectedly, uranium was found in the brain of DU-implanted animals. No behavioral neurotoxicity was evident. Excitability of hippocampal neurons was reduced in the high DU dose animals at 6 months. These data suggest that at the 6-month time point, renal toxicity may be less of a hazard than anticipated. While these results indicate that toxicity is not evident at 6 months with exposure to embedded DU, there is a need to further investigate long-term effects in light of the high levels accumulated in some body tissues.
DTIC
Pellets; Spent Fuels; Toxicity; Uranium

20070005413 Jackson (Henry M.) Foundation, Rockville, MD USA
Epidemic Outbreak Surveillance (EOS)
Scofield, Thomas C; Jul 2005; 5 pp.; In English
Contract(s)/Grant(s): W81XWH-04-1-0669
Report No.(s): AD-A460105; No Copyright; Avail.: CASI: A01, Hardcopy

This funding was granted to The Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc. (HJF) to provide the administrative, management, logistical, and programmatic services in collaboration with HQ, USAF/SGR in accordance with the statement of work and with tasks developed by the research. The goal of this project is to develop and test new technologies for the diagnosis and surveillance of respiratory tract pathogens. The funding supported the hiring of technical and administrative personnel necessary to carry out protocols to standardize methods of specimen collection and to optimize the processing of these specimens. After these processes were established, initial enrollment of healthy, ill, and recovered Basic Military Trainees (BMTs) began. In accordance with the statement of work, HJF successfully established administrative and programmatic support services to support the operations and management of the Epidemic Outbreak Surveillance (EOS) project. HJF continues to provide administrative, management, and programmatic support services as deemed necessary for implementation and as requested by HQ, USAF/SGR for the development of an integrated health surveillance venue focused upon epidemic outbreaks of acute respiratory disease (ARD) and other endemic and seasonal respiratory infections.
DTIC
Infectious Diseases; Microorganisms; Pathogens; Research Management; Respiratory Diseases; Surveillance

20070005416 South Carolina Univ., Columbia, SC USA

The Effect of a Home-Based Walking Intervention on Quality of Life, Body Composition, and Estrogen Metabolism in Postmenopausal Breast Cancer Survivors

Wilcox, Sara; Sep 2006; 8 pp.; In English

Contract(s)/Grant(s): DAMD17-01-1-0628

Report No.(s): AD-A460108; No Copyright; Avail.: CASI: A02, Hardcopy

Increased incidence of and survival from breast cancer have resulted in growth of the number of women who have survived this disease and are faced with the subsequent consequences of their diagnosis and treatment. Physical activity (PA) is a modifiable health behavior that has the potential to address both the emotional and physical needs of women with early stage breast cancer. However, for PA to be seen as a viable treatment option, and for a change in routine care to occur, its effectiveness must be determined. Thus, the objectives of this pilot study were to: 1) quantify the effect of a 12-week homebased walking intervention on quality of life, body composition, and estrogen metabolism in survivors of breast cancer, and 2) develop and test the feasibility of PA intervention materials for future studies in this population. A total of 33 participants were enrolled and 21 of these were randomized to the walking program. No participants met inclusion criteria for the estrogen metabolism sub-study. Completion of counseling calls and adherence to the walking prescription were high among the walking group. Medium to large increases in PA as well as medium improvements in many domains of health-related quality of life were found among walking but not control participants. Home-based walking programs appear to be a feasible and promising form of intervention for breast cancer survivors.

DTIC

Breast; Cancer; Estrogens; Mammary Glands; Metabolism; Walking

20070005457 University of Southern Mississippi, Hattiesburg, MS USA

Coatings and Biodegradable and Bioabsorbable Films

Thames, Shelby F; Rawlins, James W; Sep 2006; 59 pp.; In English

Contract(s)/Grant(s): N00014-04-1-0703

Report No.(s): AD-A460176; No Copyright; Avail.: CASI: A04, Hardcopy

Research and development activities focused on environmentally friendly monomer, polymer and composite materials for Navy coating and packaging needs. Specifically focusing on the plasticizing effects of vegetable oil macromonomers as incorporated into emulsion polymers for efficient almost zero VOC film formation and the additional benefit of auto-oxidative polymerization after application. The resulting formulated coatings met or exceeded each of the specified Military specifications and are currently being evaluated for larger surface area application ease in combination with monomer and polymer scale up and commercialization. Polyesters and polyester-urethane block copolymers were evaluated for potential as biodegradable food packaging and pallet stretch wrap. The screening studies have resulted in materials with similar toughness as conventional materials and cursory data suggest acceptable biodegradability. Further evaluations will be performed in conjunction with the Natick Soldier Center.

DTIC

Biodegradability; Biodegradation; Coatings

20070005469 Naval Health Research Center, San Diego, CA USA

Analysis of fMRI Data by Blind Separation into Independent Spatial Components

McKeown, Martin J; Makeig, Scott; Brown, Greg G; Jung, Tzyy-Ping; Kindermann, Sandra S; Bell, Anthony J; Sejnowski, Terrence J; Jun 1997; 31 pp.; In English

Report No.(s): AD-A460194; NHRC-REPT-97-42; No Copyright; Avail.: CASI: A03, Hardcopy

Current analytical techniques applied to functional magnetic resonance imaging (fMRI) data require a priori knowledge or specific assumptions about the time courses of processes contributing to the measured brain electrical signals. Here we describe a new method for analyzing fMRI data based on the independent component analysis (ICA) algorithm of Bell and Sejnowski. We decomposed eight fMRI data sets from 4 normal subjects performing various cognitive tasks. By utilizing higher-order statistics to enforce successively stricter criteria for spatial independence between component maps, both the ICA algorithm and related fourth-order decomposition technique were superior to principal component analysis (PCA) in determining the spatial and temporal extent of task-related activation. ICA appears to be a highly promising method for the analysis of fMRI data from normal and clinical populations.

DTIC

Brain; Imaging Techniques; Magnetic Resonance; Spatial Distribution

20070005473 Jackson (Henry M.) Foundation, Rockville, MD USA

Molecular Biology and Prevention of Endometrial Cancer

Maxwell, George L; Jul 2006; 18 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-02-1-0183
Report No.(s): AD-A460283; No Copyright; Avail.: CASI: A03, Hardcopy

To increase our understanding of the molecular aberrations associated with endometrial carcinogenesis and the biologic mechanisms underlying the protective effect of oral contraceptive (OC) therapy. 1) Oligonucleotide microarray analysis was performed on a panel of endometrial cancers. 2) A subset of adenocarcinoma cases from the International DES Registry (IDESR) was analyzed for MSI 3) A case-control study of the CASH database was performed to evaluate the relationship between progestin potency and endometrial cancer risk. 4) An analysis of endometrium samples from cymologous macaques that were exposed to long term progestins was performed. 5) A clinical trial comparing progestin versus placebo is underway that will facilitate investigation of the effects of progestin exposure on the endometrial lining. 1) Different histological types of endometrial cancer have unique genomic expression patterns. 2) The poor quality DNA from the majority of IDESR samples prohibited an adequate analysis of the case set. 3) A case-control study has suggested higher progestin- potency OCs may be more protective than lower progestin potency OCs among women with a larger body habitus. 4) Macaque studies have suggested that induction of apoptosis may be a mechanism underlying the chemoprotective effects of progestin on the endometrium. 5) Regulatory hurdles have resulted in delays in initiation of the clinical trial. Final FDA approval is expected within the next 3-4 months and the original objectives in the statement of work will be addressed.

DTIC

Cancer; Chemotherapy; Drugs; Females; Hormones; Molecular Biology; Prevention

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20070005475 California Univ., Irvine, CA USA

Dietary Determinants of Prostate Cancer

Chu, Lisa W; Mar 2006; 8 pp.; In English
Contract(s)/Grant(s): DAMD17-03-1-0157
Report No.(s): AD-A460285; No Copyright; Avail.: CASI: A02, Hardcopy

Prostate Cancer (PCa) accounts for nearly 30% of all newly diagnosed cancers among American men. Epidemiologic studies suggest that dietary factors may be important in the etiology of this disease. The objective of our research is to determine how nutritional compounds genistein, betasitosterol (SIT), and omega-6 fatty acids (FA) function as modulators of PCa. In the third and final year of this fellowship, the fellow joined the National Cancer Institute's Cancer Prevention Fellowship Program and has continued working on the DOD-PCRP Postdoctoral Fellowship project and 30% effort (with knowledge and approval from the DOd-PCRP). During this year, we finished printing our custom microarray as well as optimized the hybridization protocol. We are currently performing expression analysis using the microarrays for both the in vitro and in vivo experiments using well established cell lines. Finally, we have initiated xenograft in vivo experiments with a novel PCa model that was developed recently in a collaborating laboratory.

DTIC

Cancer; Determinants; Diets; Epidemiology; Etiology; Nutrition; Prostate Gland

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20070005476 Texas A&M Univ., College Station, TX USA

Inhibitory Ah Receptor-Androgen Receptor Crosstalk in Prostate Cancer

Safe, Stephen; Feb 2006; 93 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-02-1-0147
Report No.(s): AD-A460286; No Copyright; Avail.: CASI: A05, Hardcopy

Treatment for prostate cancer depends on multiple factors including the stage of the tumor and expression of the androgen receptor (AR). Endocrine therapy can be used for treatment of early stage androgen-responsive tumors, whereas chemotherapy for later stage androgennon responsive tumors is problematic. We investigated the aryl hydrocarbon receptor (AhR) as a potential target for treating prostate cancer using a new series of relatively non-toxic selective AhR modulators (SAhRMs). Initial studies showed that 22RV1, PC3 and LNCaP prostate cancer are Ah-responsive. Two SAhRMs, namely diindolylmethane (DIM) and 6-methyl-1,3,8- trichlorodibenzofuran (6-MCDF), inhibited growth of AR-positive 22RV1 and ARnegative PC3 cells. AhR ligands inhibited dihydrotestosterone-induced upregulation of AR protein in 22RV1 cells, suggesting a possible mechanism for inhibitory AhR-AR crosstalk. The growth inhibitory effects of SAhRMs in PC3 cells suggests that AhR ligands also inhibit growth of androgen-nonresponsive cells. In addition, substituted DIMs inhibit growth

of prostate cancer cells and modulate AR expression, and these are currently being investigated.
DTIC
Cancer; Chemotherapy; Crosstalk; Hormones; Males; Prostate Gland

20070005480 West Virginia Univ., Morgantown, WV USA
Randomized Trial of Neuroprotective Effects of Erythropoietin in Patients Receiving Adjuvant Chemotherapy for Breast Cancer: Position Emission Tomography and NE
Abraham, James; Sep 2006; 7 pp.; In English
Contract(s)/Grant(s): DAMD17-02-1-0621
Report No.(s): AD-A460291; No Copyright; Avail.: CASI: A02, Hardcopy

Adjuvant treatment with Adriamycin and cyclophosphamide (AC) clearly prolongs the overall survival in women with breast cancer. Cognitive deficits (e.g. problems with memory and concentration) are common during and after adjuvant breast cancer chemotherapy, but the pathophysiology of cognitive phenomens is unknown. The goal of this project is to study the pathophysiology of cognitive dysfunction in patients receiving adjuvant treatment using Positron Emission Tomography (PET) scan.
DTIC
Breast; Cancer; Chemotherapy; Cyclic Compounds; Drugs; Mammary Glands; Pathogenesis; Patients; Positrons; Tomography

20070005481 Virginia Commonwealth Univ., Richmond, VA USA
Molecular Mechanisms of Prostate Cancer Progression
Holt, Shawn E; Elmore, Lynne W; Jan 2006; 35 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-02-1-0152
Report No.(s): AD-A460292; No Copyright; Avail.: CASI: A03, Hardcopy

To define the mechanisms involved in prostate cancer progression we have found that molecular chaperones are elevated causing increased telomerase activity. In order to determine the importance of the chaperones during prostate cancer progression we proposed 2 specific aims: 1-define whether ectopic chaperone expression results in transformation and 2-determine whether chaperones are targets for prostate cancer therapy. The hsf-1 transcription factor was over-expressed in non-tumorigenic prostate cells resulting in increased hsp90 and hsp70 expression an upregulation of telomerase through a global chaperone increase and no effect on tumorigenicity. Using both a pharmacologic (radicicol) and genetic (siRNA) approaches depletion of functional Hsp90 in prostate cancer cells caused dramatic telomere shortening followed by apoptosis. Of particular significance these cells exhibit a high level of nitric oxide synthase (NOS)-dependent free radical production and simultaneous treatment of cells with the NOS inhibitor L-NAME resulted in telomere elongation and prevention of apoptosis. In addition we observe significant DNA damage assessed by telomere dysfunction although in the absence of a classical DNA damage response. Overall our data suggest a novel mechanism whereby inhibition of Hsp90 disrupts free radical homeostasis and contributes directly to telomere erosion further implicating Hsp90 as a potential therapeutic target for prostate cancer.
DTIC
Cancer; Homeostasis; Prostate Gland

20070005482 California Univ., San Francisco, CA USA
Soy and Tamoxifen for Breast Cancer Prevention in High Risk Pre-Menopausal Women
Tice, Jeffrey A; Oct 2005; 20 pp.; In English
Contract(s)/Grant(s): DAMD17-01-1-0198
Report No.(s): AD-A460295; No Copyright; Avail.: CASI: A03, Hardcopy

We conducted a feasibility study to assess the efficacy and safety of dietary soy for breast cancer prevention in pre-menopausal women at elevated risk of breast cancer. Mammographic breast density, a potential surrogate marker for breast cancer risk, was used as the primary entry criterion and the primary outcome. 47 pre-menopausal women with breast density ! 50% on mammography were randomized to either 25 mgld of soy protein containing 50 mg total isoflavones or 25 mglday of milk protein containing 0 mg of total isoflavones for 6 months. At randomization, the average 5-year Gail risk was 2.0% and the average breast density was 73% (range 59%-90%). The average change in percentage breast density was -2.7% in the soy arm and -2.4% in the placebo arm (p=O.48). There were no differences between groups in the change in lGF-I or lGFBP3. The results of this study do not support the hypothesis that 6 months of soy protein reduces the risk of breast cancer in

pre-menopausal women. However, the intervention was relatively short and the primary outcomes were surrogate markers of risk.
DTIC
Breast; Cancer; Females; Mammary Glands; Prevention; Proteins; Risk

20070005483 Duke Univ., Durham, NC USA
Optical Spectroscopy and Multiphoton Imaging for the Diagnosis and Characterization of Hyperplasias in the Mouse Mammary
Skala, Melissa C; Sep 2006; 53 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-04-1-0330
Report No.(s): AD-A460297; No Copyright; Avail.: CASI: A04, Hardcopy

The purpose of the first part of this project is to develop a method to diagnose mammary gland hyperplasias in an animal model in vivo using optical spectroscopy, so that the progression of benign lesions could be studied over time. The absorption and scattering parameters extracted from diffuse reflectance spectra measured in vivo were used to differentiate normal tissue (n=23) and benign lesions (n=16) in the mammary glands of ENU-treated FVBxB6 ApcMin/+ mice. Wilcoxon rank sum tests revealed a statistically significant increase (p\h0.05) in total hemoglobin concentration for benign lesions compared to the normal mammary gland. Statistically significant differences (p\h0.05) in the mean reduced scattering coefficient were also found between two sub-classes of benign lesions. The purpose of the second part of this project is to establish fluorescence lifetime imaging of NADH as an in vivo metabolic imaging technique, which could be used for pre-cancer diagnosis and for monitoring cancer therapies. Multiphoton microscopy of the fluorescence lifetime of normal (n=9) and pre-cancerous (n=12) epithelial tissues in vivo revealed a decrease in the lifetime of protein-bound NADH with pre-cancer development (p\h0.05), and cell culture experiments on MCF10A human breast cells reveal that NADH fluorescence lifetimes are sensitive to changes in oxidative phosphorylation and glycolysis.
DTIC
Breast; Cancer; Diagnosis; Glycolysis; Imaging Techniques; Lesions; Mammary Glands; Mice; Phosphorylation; Spectroscopy

20070005484 George Washington Univ., Washington, DC USA
Naked DNA Immunization of Prevention of Prostate Cancer in a Dunning Rat Prostate Tumor Model
Mincheff, Milcho; Jun 2006; 93 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-02-1-0239
Report No.(s): AD-A460300; No Copyright; Avail.: CASI: A05, Hardcopy

After cloning a truncated (no peptide leader sequence) versions of the human prostate acid phosphatase (H-PAP-T), the human prostate-specific antigen (HPSA- T) and the rat analogue of the human PSMA (R- PSMA -S), all plasmids were produced under GLP conditions. Their safety was tested in rats and the efficacy to stimulate T cells and to prevent development of transplantable tumors was shown in a rat model. Best protection was obtained following immunization with a cocktail containing all plasmids and a plasmid encoding rat GM-CSF. None of the animals immunized with the truncated plasmids developed antibodies against the native antigen while immunization with a plasmid encoding for an antigen that was secreted did. The antibodies were of mixed (Th1 and Th2) type (IgG1 and IgG2a). When priming was performed with the truncated version of the vaccines (HPSMA-T or HPSA-T), however and boosting with the secreted ones, the antibodies were mainly of the Th1 (complement-binding) type (IgG2a and IgG2b). The best protection was achieved when priming was performed with a plasmid encoding a xenogeneic protein and boosting with a plasmid encoding a syngeneic one. Genetic modification of rat tumor cells that led to expression of human (xeno) antigens, made them immunogenic, identifying other possible practical applications for vaccine design.
DTIC
Cancer; Deoxyribonucleic Acid; Genetics; Immunology; Prevention; Prostate Gland; Rats; Tumors

20070005500 McGill Univ., Montreal, Quebec Canada
Nuclear Receptor Interactions in Breast Cancer: The Role of Kinase Signaling Pathways
Pettersson, Filippa; Jul 2006; 9 pp.; In English
Contract(s)/Grant(s): DAMD17-03-1-0472
Report No.(s): AD-A460331; No Copyright; Avail.: CASI: A02, Hardcopy

Retinoids and rexinoids are vitamin A derivatives, which cause growth inhibition and/or apoptosis in various cell types,

including some breast cancer cells. Retinoids bind and activate the nuclear receptor RAR, whereas rexinoids specifically bind to the related receptor RXR. While retinoids like RA inhibit the growth of estrogen receptor (ER) positive and not ER negative breast cancer cells, rexinoids appear to have activity in both ER positive and ER negative models. In addition, it has been reported that the rexinoid bexarotene can prevent the development of multidrug resistance following exposure to chemotherapy agents. In this report I describe studies of the interactions of different nuclear receptors in breast cancer cells. I have studied how expression of ER affects the phosphorylation status and activity of RAR , and found that reexpression of either ER or increases phosphorylation of RAR and also increases the activity of MAPK and PKC pathways. I have also studied how rexinoids modulate the activity of the SXR/RXR heterodimer, and have found that several rexinoids suppress activation of SXR by SXR agonist such as Rifampicin and the chemotherapeutic agent Taxol, which may provide a mechanism to explain how rexinoids can prevent the development of drug resistance.
DTIC
Breast; Cancer; Mammary Glands; Nuclear Interactions

20070005510 Oregon State Univ., Corvallis, OR USA
DNA Precursor Metabolism and Mitochondrial Genome Stability
Mathews, Christopher K; Apr 1, 2003; 11 pp.; In English
Contract(s)/Grant(s): DAAD19-03-1-0032
Report No.(s): AD-A460347; No Copyright; Avail.: CASI: A03, Hardcopy

This project investigated DNA precursor metabolism in mammalian mitochondria, attempting to define relationships between deoxyribonucleoside triphosphate (dNTP) metabolism and mutagenesis in the mitochondrial genome. Specific contributions include: (1) We found that conditions altering the normal balance among the four dNTP pools within the mitochondrion stimulate both point and deletion mutagenesis; (2) dNTP pools in mitochondria from some tissues are highly asymmetric contributes toward the elevation of mitochondrial mutation rates compared to nuclear muation rates; (3) Mitochondrial dNTP pools do not show significant age-related changes in the rat, ruling out such changes as causative agents in aging-related accumulation of mitochondrial mutations; (4) A protein previously identified as a mitochondrial deoxyribmucleotide carrier, responsible for dNTP uptake into mitochondria, plays a quite different metablic role; (5) Mammalian mitochondria contain a novel ribonucleotide reductase, which may play a sinificant role in mitochondrial dNTP synthesis.
DTIC
Deoxyribonucleic Acid; Genome; Metabolism; Mitochondria; Stability

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20070005516 Nebraska Univ., Omaha, NE USA
Estrogen-Induced Depurination of DNA: A Novel Target for Breast Cancer Prevention
Cavalieri, Ercole L; May 2006; 126 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-03-1-0229
Report No.(s): AD-A460366; No Copyright; Avail.: CASI: A07, Hardcopy

The COE investigators made outstanding progress in the third year. We found that we can analyze 40 metabolites, conjugates and depurinating DNA adducts of estrogens in the urine and serum of women. The women with breast cancer had high levels of depurinating adducts in the urine, whereas the control women had baseline levels. For the first time, it was demonstrated that E2 induces complete transformation of human epithelial cells with formation of tumors in SCID mice. Furthermore, the ability to characterize cell transformation at the combined levels of the complete genome and the individual gene was determined. The lac I rats showed low mutagenic activity of the mammary tissue when treated with 4-OHE2 and no mutagenicity after treatment with 2-OHE2. The ERKO mice without estrogen receptors, E2 induced tumors in mammary tissue and produced genotoxic metabolites. All these findings provide strong support that estrogens can become genotoxic compounds and eventually initiate breast cancer.
DTIC
Breast; Cancer; Deoxyribonucleic Acid; Estrogens; Mammary Glands; Prevention; Targets

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*.

20070003643 Institute of Space Medico-Engineering, Beijing, China

Space Medicine and Medical Engineering, Volume 19, No. 5

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The topics discussed include: 1) Protection Effects of a New Combined Anti-G Measure; 2) Fitting APD Restitution with Artificial Neural Network; 3) Prophylactic Effects of Choline Chloride on Muscle Atrophy in Tail-suspended Rats; 4) Effects of Tail Suspension on Renin-angiotensin System in Rat Myocardium; 5) Effects of Irradiation with Different Dose Rates of X-ray on Mouse Immune System; 6) Protective Effects of Vitamin E on Injury to Male Reproductive Function in Tail-suspended Rats; 7) Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity; 8) Simulation Study on Performance of Control by Man and Machine in the Stage of Final Approaching for Rendezvous and Docking; 9) Development of a Complex Experimental System for Studies of Controlled Ecological Life Support Technique; 10) Research on ECG Denoising during Spaceflight; 11) Study on Operational Reliability of Astronaut in Spacecraft Cabin; 12) Research of Biomechanical Evaluation Methods of Hand Performance Fatigue; 13) Study on Modified Delphi Method as Used for Index Filtration in Ergonomic Evaluation of Cockpit Display; 14) sEMG Dynamics of Muscle Fatigue Induced by Maximal Voluntary Isometric Contractions; 15) Design of a Wearable Respiratory Inductive Plethysmograph and Its Applications; 16) Development of Controlled Ecological Life-support System in Russia; and 17) Effects of Microgravity on Human Spatial Orientation in Space Flight

CASI

Aerospace Medicine; Bioengineering; Medical Electronics; Artificial Intelligence

20070003644 Fudan Univ., Shanghai, China

Fitting APD Restitution with Artificial Neural Network

Han, Xiao-dong; Fang, Zu-xiang; Yang, Cui-wei; Wu, Xiao-mei; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 319-323; In English; See also 20070003643

Contract(s)/Grant(s): NNSF-30400102; MOE-20030246025; Copyright; Avail.: Other Sources

To study the complex restitution relation between the present action potential duration (APD) and its previous diastole interval (DI) and APD. The Luo-Rudy model was paced with different protocols to draw the coordinate curves between the pre D and its first previous DI. These curves were fit with the artificial neural network (ANN). Different pacing protocols caused different coordinate curves, and there was no one-to-one relation between present APD and its first previous DI. ANN fits these curves satisfactorily. There is a complex relation between the present APD and the APDs and Dls of the first three previous beats. This relation can be modeled accurately with ANN.

Author

Neural Nets; Artificial Intelligence; Dynamic Models; Time

20070003645 Institute of Aviation Medicine, Beijing, China

Protection Effects of a New Combined Anti-G Measure

Jin, Zhao; Geng, Xi-chen; Zhang, Li-fan; Zhang, Li-hui; Li, Bao-hui; Li, Qian; Wang, Hong; Yan, Gui-ding; Li, Yi-feng; Li, Li-hua; Xu, Yan; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 313-318; In English; See also 20070003643; Copyright; Avail.: Other Sources

To observe the protection effects of a new combined anti-G measure, which is composed of new bladder anti-G system, unassisted positive pressure breathing for G (PBG) and PHP maneuver. The problem of fatigue and pain when using this measure is also discussed. Each of the six fully qualified centrifuge subjects experienced 5 groups of centrifuge runs:l) relaxed + Gz tolerance without anti-G equipments and PHP maneuver;2) + Gz tolerance with FLH-x + KT-x;3) + Gz tolerance when performing PBG with FLH-x, KT-x, YM-x and TK-x;4) +6.5 Gz for 45 s using the same anti-G equipments as the 3rd group;5) +9.0 Gz for 15 s using the same anti- G equipments as the 3rd group and performing PHP maneuver. There were no incidents of G-induced loss of consciousness in this study. The protective effects of FLH-x + KT-x, PBG and PHP maneuver were 2.5

G, 1.67 G and 1.23 G respectively. All the subjects had accomplished the 6.5 G 45 s and 9.0 G 15 s runs with the new combined anti-G measure. The pain occured on neck, waist, arm and hands. The new combined anti-G measure can provide enough anti-G protection for modern high performance aircraft. How to prevent the occurrence of neck injury and alleviate the pain induced by G when using this measure needs further investigation.
Author (revised)
Antigravity; Protection; Pressure Breathing; Bladder; Aerospace Medicine

20070003646 Institute of Space Medico-Engineering, Beijing, China
Effects of Microgravity on Human Spatial Orientation in Space Flight
Song, Jian; Liu, Xu-feng; Miao, Dan-min; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 388-390; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

In the researches of space flight, studies of the effects of microgravity on visual orientation were relatively few. This paper reviews recent progress on this topic. It surveys the spatial orientation problems encountered in spaceflight including 0-G inversion illusions, visual reorientation illusions, EVA height vertigo, and spatial memory problems described by astronauts. A vector model for sensory cue interaction was briefly described.
Author
Microgravity; Manned Space Flight; Aerospace Medicine; Attitude (Inclination)

20070003647 China Astronaut Research and Training Center, Beijing, China
Simulation Study on Performance of Control by Man and Machine in the Stage of Final Approaching for Rendezvous and Docking
Zhou, Qian-xiang; Qu, Zhan-sheng; Wang, Chun-hui; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 345-349; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

To study the performance evaluation of integration rendezvous and docking (RVD) control by man and machine in order to provide reference for function allocation between man and machine. By a rendezvous and docking experimental system, 30 male volunteers aged 20-40 took part in the performance evaluation experiments. The RVD integration control success rates and total thruster ignition time were chosen as evaluation indices. The experiment showed that if less than three RVD parameters control tasks were completed by the subjects and the rest of parameters control task completed by automation, the RVD success rate would be larger than 80.47% and the fuel consumption would be optimized. In addition, there were ten subjects who finished the whole 6 RVD parameters control tasks by enough train. If the astronauts role should be integrated into the RVD control, it is suitable for them to finish the heading, pitch and roll control in order to assure the man-machine system high performance. When astronauts were needed to finish all parameters control, two points should be taken into consideration, enough fuel and unconstraint operation time.
Author (revised)
Man Machine Systems; Orbital Rendezvous; Simulation; Spacecraft Docking; Approach

20070003648 China Astronaut Research and Training Center, Beijing, China
Development of a Complex Experimental System for Studies of Controlled Ecological Life Support Technique
Guo, Shuang-sheng; Tang, Yong-kang; Zhu, Jing-tao; Wang, Xiao-xia; Yin, Yong-li; Feng, Hong-qi; Al, Wei-dang; Liu, Xiang-yang; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 350-353; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

To develop a complex experimental system as a test platform for further integrated experiments and material close-loop experiments of the controlled ecological life support system (CELSS). Basing on a large amount of plan investigations, plan designs and drawing d&igns, the system was built through the steps of processing, installation and joined debugging. The system comprises a cabin with the volume of about 40 cubic meters; its interior atmospheric parameters such as temperature, relative humidity, oxygen concentration, carbon dioxide concentration, total pressure, lighting intensity, photoperiod, water content in the growing-matrix and ethylene concentration were all monitored and controlled automatically and effectively, and remained good stability. The growing system consists of two rows of racks along its left-and-right sides separately , and either of which has upper and lower layers; eight growing beds hold a total area of about 8.4 square meters, and the vertical distance between the two layers can be adjusted automatically and independently; lighting sources consist of a combination of red and blue light-emitting diodes. The system provides essential conditions for future large-scale integrated studies of controlled ecological life support techniques.
Author (revised)
Closed Ecological Systems; Complex Systems; Automatic Control; Ecosystems

20070003649 BeiHang Univ., Beijing, China

Study on Modified Delphi Method as Used for Index Filtration in Ergonomic Evaluation of Cockpit Display

Li, Yin-xia; Uiam. Xoi-gam; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 368-372; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

To build an index system for ergonomic evaluation of cockpit display. The modified Delphi method was proposed to build the index system. Firstly, on the basis of systematic, in-depth analysis and integration of the related information such as military standards, norms and technical productions both domestic and abroad, an index system for cockpit display ergonomic evaluation was primarily built. Then, 23 fighter pilots were referred twice as the specialized consultants upon preliminary index system with the modified Delphi method. Finally, the comments of the specialized consultants were statistically analyzed. Based on the two times of information from the specialized consultants, the indexes that could cause more impact on pilots' efficiency were selected. Modified Delphi method characterized with referring and synthesizing experimental results from experts is scientific and operatable.

Author (revised)

Cockpits; Delphi Method (Forecasting); Display Devices; Human Factors Engineering

20070003650 BeiHang Univ., Beijing, China

Development of Controlled Ecological Life-support System in Russia

Liu, Hong; Ui. Cjemg-ying; Pang, Li-ping; Wang, Jun; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 382-387; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

Controlled Ecological Life-support System (CELSS) is one of the key technologies that must be solved before founding permanent base in space such as Lunar or Mars base. After discussing with Russian experts and analysing the data, the author introduced something important about CELSS in Russia, including research methods, achievements and problems to be solved urgently. In the end a proposal for developing CELSS research in China was given based on them.

Author

Closed Ecological Systems; Russian Federation; Technology Utilization; Controlled Atmospheres

20070003651 Institute of Space Medico-Engineering, Beijing, China

sEMG Dynamics of Muscle Fatigue Induced by Maximal Voluntary Isometric Contractions

Zhang, Hai-hong; Wang, Jian; Yang, Zhen; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 373-376; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

To investigate the effect of muscle fatigue on linear and nonlinear dynamics of sEMG from biceps brachii during maximal voluntary isometric contractions. Ten young volunteers subjects performed non-fatiguing isometric contractions with four load levels and fatiguing maximal voluntary isometric contractions. Linear and nonlinear analysis were used to examine the sEMG signals and the changes of sEMG signals when MVC decreased to levels of 80% MVC, 70% MVC, 60%MVC and 50% MVC compared with the signals of sEMG during non-fatiguing contractions. Statistical analyses revealed that AEMG and %DET were significantly higher at fatigue states than those at non fatigue states, while MPF and C(n) were significantly lower than those at non fatigue states. With the development of muscle fatigue, MPF and % DET significantly decreased during maximal effort, while AEMG and % DET stayed stable. The interaction of load level and fatigue state for AEMG, MPF and C(n) were significant. MPF and C(n) significantly decrease during maximal voluntary isometric contractions. sEMG dynamics between fatigue state and non-fatigue state is significantly different.

Author (revised)

Muscles; Fatigue (Biology); Electromyography; Contraction

20070003652 Institute of Space Medico-Engineering, Beijing, China

Effects of Tail Suspension on Renin-angiotensin System in Rat Myocardium

Bao, Jun-xiang; Zhang Li-fan; Ma, Jin; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 329-332; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

To study the changes of gene and protein expressions of key components of renin- angiotensin system (RAS) in myocardium of simulated weightless rats. Tail-suspended rats were adopted as animal model of simulated weightlessness. RT-PCR and Western blot analysis were performed to examine mRNA and protein expressions in rat myocardium, respectively. After 1 week tail-suspension, no obvious changes in angiotensinogen (AGT), angiotensin converting enzyme (ACE), la and lb subtype of type 1 angiotensin II receptor (AT(sub 1a) and AT(sub lb)), key components of RAS in myocardium were observed. But after 4 weeks tail-suspension, the expressions of AGT mRNA and higher molecular weight

band of AGT protein increased significantly (P less than 0.05), which the lower molecular weight band had no evident change. mRNA expression of AT(sub 1a) increased significantly (P less than 0. 05), but its protein expression didn't show significant change. The increased expression of the key components of RAS in rat myocardium after 4 weeks tail suspension, might be related to elevated fibrosis in myocardium during weightlessness or simulated weightlessness.
Author (revised)
Myocardium; Rats; Renin; Vasoconstrictor Drugs; Angiotensins; Hindlimb Suspension

20070003653 Academia Sinica, Lanzhou, China
Effects of Irradiation with Different Dose Rates of X-ray on Mouse Immune System
Xie, Yi; Dang, Bing-rong; Bing, Tao; Zhang, Hong; Hao, Ji-fang; Guo, Hong-yun; Wang, Xiao-hu; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 333-336; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

To investigate the effects of irradiation with different dose rates of X-ray on mouse immune system. Eighteen BalB/C mice were divided into 3 groups randomly: control group, low dose rate irradiated group (20 cGy/min) and high dose irradiated rate group (300 cGy/min). The low and high dose rate irradiated groups were irradiated with 1 Gy of X-ray at 20 cGy/min and 300 cGy/min. Lymphocyte cycle and apoptosis were determined by flow cytometry, and thymus and spleen indices were measured by weight. The damages caused to exposure at low dose rate to peripheral blood lymphocytes were less than that at higher dose rate. Meanwhile, thymus and spleen indices declined with the increase of dose rate. The irradiation effects on male-mice were stronger than those on females. The lower dose rate can reduce radiation damage to the immune system than the higher dose rate; and female mice are more radiation resistant than males.
Author (revised)
Dosage; Irradiation; Mice; X Rays; Immune Systems

20070003654 China Astronaut Research and Training Center, Beijing, China
Research on ECG Denoising during Spaceflight
Liang, Zhong-gang; Wang, Qin; Yan, Hong; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 354-357; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

To find a method for denoising of ECG signals during spaceflight. According to noise character of ECG during spaceflight, a new denoising method that combines wavelet transform and shape filter was put forward. By practical application and simulation test, it was proved that this method could eliminate efficiently noise from ECG during spaceflight. The method that combines wavelet transform and shape filter can be used for ECG denoising during spaceflight.
Author (revised)
Electrocardiography; Manned Space Flight; Research and Development; Noise Reduction

20070003655 Institute of Space Medico-Engineering, Beijing, China
Prophylactic Effects of Choline Chloride on Muscle Atrophy in Tail-suspended Rats
Gao, Yun-fang; He, Zhi-xian; Fan, Xiao-li; Wu, Su-di; Song, Xin-ai; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 324-328; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

To study the effects of choline chloride on activities of myosin adenosine triphosphatase (mATPase) of muscle fibres and muscle atrophy in tail-suspended rats. Twenty four adult female Sprague-dawley rats were averagely divided into 3 groups matched for body mass : control group (CON), tail suspension group (TS) and tail suspension group associated with choline chloride (TS + Cch). Weightlessness was simulated by 14 d tail suspension of rats; gastric lavage with choline chloride was given to 1/2 of the rats during tail suspension (15 mg/kg body weight. i. g.). Activities of myosin adenosine triphosphatase (mATpase) of intrafusal and extrafusal fibres in soleus (SOL) muscle were determined by Ca2+-ATPase method. Paraffin sections of the soleus muscle were prepared by routine histochemistry method. After tail suspension for 14 d it was found: 1) percentage of type II fibre in SOL of rats treated with choline chloride decreased distinctly as compared with that in the untreated rats (P less than 0.001) ; 2) gaps of fascicles were closer in choline chloride treated group, and cross sectional area (CSA) of (type I and II) all increased obviously as compared with those in untreated group (P less than 0.001) ; 3) the activities of mATPase in intrafusal fibres were similar to the two groups except one nuclear chain fibre. Choline chloride effectively prevents muscle atrophy, as well as the transformation of slow-twitch muscle to fast-twitch muscle caused by tail suspension. It is also showed that the suppression on the increase of mATPase activities caused by weightlessness might be the essential mechanism.
Author (revised)
Atrophy; Chlorides; Choline; Muscles; Rats; Hindlimb Suspension; Prophylaxis

20070003656 China Astronaut Research and Training Center, Beijing, China

Study on Operational Reliability of Astronaut in Spacecraft Cabin

Wang, Zheng; Wang, Li; Xu, Run-tao; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 358-362; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

To analyze human operational reliability, and to provide suggestions for design of controllers in spacecraft cabin. Twenty-two male subjects participated in 924 person times of experiments. The experiments were divided into 6 groups to study the effect of space suit glove, time interval and task on human operational reliability in spacecraft cabin. 1) Task had obvious effects on operational reliability and time (P less than 0.001) .2) With space suit glove, there was considerable increase in operational time (P less than 0.05). 3) Time interval affected operational time observably (P less than 0.001). Human operational reliability decreases when time interval was delayed or shortened. 4) Subject type had significant effects on operational reliability (P less than 0. 01). Veteran subjects were more reliable than inexpert subjects in operation. According to the results, two suggestions were provided for the design of controllers in spacecraft cabin.

Author (revised)

Astronauts; Spacecraft Cabins; Human Factors Engineering; Flight Operations

20070003657 BeiHang Univ., Beijing, China

Research of Biomechanical Evaluation Methods of Hand Performance Fatigue

Ding, Li; Yang, Feng; Chen, Shou-ping; Yang, Chun-xin; Yuan, Xiu-gan; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 363-367; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

To find a biomechanical evaluation methods of manual performance fatigue, for providing the feasible methods for the hand fatigue of spacesuit glove. Twelve females and fourteen males in two groups served as the subjects and participated in the experiments of changeless force fatigue, including gripping, pinching and screwing, and took part in the nondimensional force fatigue. Manual performance fatigue could be fully evaluated based on gripping, pinching and screwing. The nondimensional force fatigue had widely applied ranges and well veracity. The combination of nondimensional subjective and objective evaluations was the optimal fatigue evaluation method. The results can provide the feasible methods for performance evaluation of spacesuit glove system.

Author (revised)

Biodynamics; Hand (Anatomy); Fatigue (Biology); Aerospace Medicine; Research and Development

20070003658 Institute of Space Medico-Engineering, Beijing, China

Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity

Wu, Chang-li; Gao, Shu-jing; Jiang, Qing-yan; Feng, DIng-yuan; Tian, Xiu-chun; Yang, Xiang-zhong; Zhang, Shou-quan; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 340-344; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

To detect gene expression of G6PD in Kunming mouse preimplantation embryos which were cultured in vitro under 1g gravity and simulated microgravity. Two sets of inner and outer primers were designed and synthesized according to cDNA sequences of G6PD. This gene expression was detected in Kunming mouse preimplantation embryos by nested RT-PCR (reverse transcription-polymerase chain reaction). Under simulated microgravity condition, the percentages of passing 2-cell development block embryos and blastocysts in CZB + l0%FCS were lower than those under lg gravity. It is suggested that the frequency of early embryonic lethality is possibly increased by simulated microgravity. With two pairs of inner and outer primers of G6PD gene, G6PD gene mRNA expression were observed in Kunming mouse 4-, 8-cell embryos, morula, blastocyst and degenerated blastocyst in vitro under 1 g gravity condition. In Embryos cultured under the simulated microgravity condition, G6PD gene mRNA expression were observed in 4-cell embryos, morula, blastocyst, and degenerated morula embryos, but not in 2-cell embryos collected from oviduct and degenerated in vitro. It is concluded that there is no difference in gene expression of G6PD between l g gravity and simulated microgravity in vitro.

Author (revised)

Embryos; Gene Expression; In Vitro Methods and Tests; Mice; Microgravity; Simulation

20070003659 Academy of Military Medical Sciences, Tianjin, China

Design of a Wearable Respiratory Inductive Plethysmograph and Its Applications

Zhang, Zheng-Bo; Yu, Meng-sun; Li, Ruo-xin; Wu, Tai-hu; Wu, Jia-long; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 377-381; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

To develop a new type of respiratory inductive plethysmograph to achieve high signal-noise rate(SNR) and low system power cost, and also to eliminate the cross-talk between chest and abdominal band sensors. Either of the two bands was powered by a very high power oscillator in a very short time, and these two bands were switched on in turn. The sensor structure of the respiratory inductive plethysmograph was modified so that these two bands could be embedded in a shirt conveniently. With these new designs, the cross-talk between these two bands was greatly eliminated and high SNR and low system power cost were achieved. This new wearable respiration monitoring system is easy to use, and can be used for long time and ambulatory monitoring. This new system meets the design requirement with excellent performance. With this new wearable respiration monitoring system, non-invasive measurement of ventilation and non-intrusive detection of sleep apnea event can be achieved.

Author (revised)

Plethysmography; Protective Clothing; Ventilation; Respiration

20070003660 Institute of Space Medico-Engineering, Beijing, China

Protective Effects of Vitamin E on Injury to Male Reproductive Function in Tail-suspended Rats

Zhou, Dang-xia; Qiu, Shu-dong; Wang, Zhi-yong; Zhang, Jie; Space Medicine and Medical Engineering, Volume 19, No. 5; October 2006, pp. 337-339; In Chinese; See also 20070003643; Copyright; Avail.: Other Sources

To study the protective effects of vitamin E(VE) on injury to male reproductive function in tail-suspended rats. Method Thirty adult male Spraque-Dawley (SD) rats were randomly divided into three groups: control, TS (tail-suspension) and VE t TS groups. TS and VE + TS groups were tail-suspended for 14 d ,and VE was given orally to VE + TS group during tail-suspension. After the treatment, weight and morphology of testes quality and amount of sperm, as well as serum hormones were observed. As compared with the control group, weight of testes, quantity and quality of sperm, as well as serum testosterone decreased significantly in TS group (P less than 0.05). VE treatment was helpful in restoring these parameters (P less than 0.05). In addition, hematoxylin and eosin (HE) stained specimens showed atrophy of seminiferous tubules, decrease of spermatogenic cells, disintegrated and shed seminiferous epithelial cells, and azoospermic lumina in rats of TS group. VE treatment significantly improved the testicular structures. VE has protective effects on the injury to male reproductive function induced by tail-suspension in rats.

Author (revised)

Injuries; Males; Rats; Tocopherol; Hindlimb Suspension

20070004776 Army Research Inst. of Environmental Medicine, Natick, MA USA

Heat Related Illnesses

Carter, R; Cheuvront, S N; Sawka, M N; Jan 2006; 9 pp.; In English

Report No.(s): AD-A459434; MISC-06-12; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459434; Avail.: Defense Technical Information Center (DTIC)

Heat illnesses range in severity form mild (heat rash, heat syncope, cramps) to serious (heat exhaustion, heat injury, heat stroke). Although heat illness can occur in anyone, an increased risk is associated with a variety of environmental factors, personal characteristics, health conditions, and medications. The risk of serious heat illness can be markedly reduced by implementing a variety of countermeasures, including becoming acclimated to the heat, managing heat stress exposure, and maintaining hydration. Athletes, coaches, training staff, and medical personnel should be vigilant for signs and symptoms of heat related illnesses. If warning signs are acted upon and body cooling rapidly administered, serious heat illness can be avoided. If heat stroke is suspected, rapid body cooling by immersion or soaking in cold water or ice water should be initiated.

DTIC

Heat Stroke; Sicknesses; Exhaustion; Heat Tolerance; Signs and Symptoms

20070004932 NASA Johnson Space Center, Houston, TX, USA

Development of Training Programs to Optimize Planetary Ambulation

Bloomberg, J. J.; Mulavara, A. P.; Peters, B. T.; Cohen, H. S.; Miller, C. A.; Brady, R.; Warren, L. E.; Rutley, T. M.; Kozlovskaya, I. B.; [2007]; 1 pp.; In English; NASA Human Research Program Investigators Workshop, 12-14 Feb. 2007, League City, TX, USA

Contract(s)/Grant(s): NCC 9-58; Copyright; Avail.: CASI: A01, Hardcopy

Astronauts experience disturbances in functional mobility following their return to Earth due to adaptive responses that occur during exposure to the microgravity conditions of space flight. Despite significant time spent performing in-flight exercise routines, these training programs have not been able to mitigate postflight alterations in postural and locomotor function. Therefore, the goal of our two inter-related projects (NSBRI-ground based and ISS flight study, ‘Mobility’) is to

develop and test gait training programs that will serve to optimize functional mobility during the adaptation period immediately following space flight, thereby improving the safety and efficiency of planetary ambulation. The gait training program entails manipulating the sensory conditions of treadmill exercise to systematically challenge the balance and gait control system. This enhances the overall adaptability of locomotor function enabling rapid reorganization of gait control to respond to ambulation in different gravitational environments. To develop the training program, we are conducting a series of ground-based studies evaluating the training efficacy associated with variation in visual flow, body loading, and support surface stability during treadmill walking. We will also determine the optimal method to present training stimuli within and across training sessions to maximize both the efficacy and efficiency of the training procedure. Results indicate that variations in both visual flow and body unloading during treadmill walking leads to modification in locomotor control and can be used as effective training modalities. Additionally, the composition and timing of sensory challenges experienced during each training session has significant impact on the ability to rapidly reorganize locomotor function when exposed to a novel sensory environment. We have developed the capability of producing support surface variation during gait training by mounting a treadmill on a six-degree-of-freedom motion device. This hardware development will allow us to evaluate the efficacy of this type of training in conjunction with variation in visual flow and body unloading.
Derived from text
Adaptation; Astronauts; Gait; Astronaut Training; Astronaut Locomotion

20070005164 NASA Johnson Space Center, Houston, TX, USA
Organization, Management and Function of International Space Station (ISS) Multilateral Medical Operations
Duncan, James M.; Bogomolov, V. V.; Castrucci, F.; Koike, Y.; Comtois, J. M.; Sargsyan, A. E.; [2007]; 1 pp.; In English; IAA Humans in Space Symposium, 20-24 May 2007, Beijing, China; Copyright; Avail.: Other Sources; Abstract Only

Long duration crews have inhabited the ISS since November of 2000. The favorable medical outcomes of its missions can be largely attributed to sustained collective efforts of all ISS Partners medical organizations. In-flight medical monitoring and support, although crucial, is just a component of the ISS system of Joint Medical Operations. The goal of this work is to review the principles, design, and function of the multilateral medical support of the ISS Program. The governing documents, which describe the relationships among all ISS partner medical organizations, were evaluated, followed by analysis of the roles, responsibilities, and decision-making processes of the ISS medical boards, panels, and working groups. The degree of integration of the medical support system was evaluated by reviewing the multiple levels of the status reviews and mission assurance activities carried out throughout the last six years. The Integrated Medical Group, consisting of physicians and other essential personnel in the mission control centers represents the front-line medical support of the ISS. Data from their day-to-day activities are presented weekly at the Space Medicine Operations Team (SMOT), where known or potential concerns are addressed by an international group of physicians. A broader status review is conducted monthly to project the state of crew health and medical support for the following month, and to determine measures to return to nominal state. Finally, a comprehensive readiness review is conducted during preparations for each ISS mission. The Multilateral Medical Policy Board (MMPB) issues medical policy decisions and oversees all health and medical matters. The Multilateral Space Medicine Board (MSMB) certifies crewmembers and visitors for training and space flight to the Station, and physicians to practice space medicine for the ISS. The Multilateral Medical Operations Panel (MMOP) develops medical requirements, defines and supervises implementation of operational countermeasures, environmental monitoring, medical care, and emergency medical services. MMOP assures the medical readiness of the Station for each subsequent mission or critical event. All boards and panels have functioned effectively and without interruptions even in various challenging circumstances. Based on the experience of the authors, consensus has prevailed as the primary nature of decisions made by all ISS medical groups, at all levels. The six first years of piloted operation have demonstrated the ability of the ISS medical authority groups and the medical infrastructure to implement medical policies and requirements, effectively interface with non-medical groups, and maintain the health and productivity of the crew in an integrated, multilaterally coordinated fashion. The medical support system appears to be mature and ready for further expansion of all Partners roles, and for the anticipated increase in the size of ISS crews.
Author
Aerospace Medicine; International Space Station; Medical Services; Organizations; Management Planning

20070005316 Calspan Corp., Buffalo, NY USA
Effects of Head Mounted Devices on Head-Neck Dynamic Response to +GZ Accelerations
Privitzer, Eberhardt; Kaleps, Ints; Armstrong, Harry 0; Apr 1989; 16 pp.; In English
Report No.(s): AD-A459960; AAMRL-TR-88-044; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459960; Avail.: CASI: A03, Hardcopy

An investigation is described which addresses the inertial loading effects of Head Mounted Devices (HMD) on aviator head-neck-spine dynamic response during high +Gz acceleration exposure. The primary objectives of this study were to develop a methodology which could be used to establish limits on HMD inertial properties and to apply this methodology to the evaluation of the severity of the internal loads -- occurring in the neck and upper spine -- associated with certain specific HMD ensembles. This paper describes how the Head-Spine Model (HSM), a highly discretized, 3-D mathematical representation of the human head-spine- torso structure, was used to: 1) establish a set of baseline response criteria (BRC); 2) establish a preliminary methodology for setting limits on HMD inertial properties; and 3) evaluate the severity of the loading associated with possible chemical defense (CD) ensembles.
DTIC
Acceleration Tolerance; Dynamic Response; Helmets; Inertia; Spine

20070005330 Armstrong Lab., Wright-Patterson AFB, OH USA
Loads Induced in the Lumbar Spine of Seated Restrained Humans by Sideward (+Gy) Impact
Strzelecki, Joseph P; Jan 1994; 12 pp.; In English
Report No.(s): AD-A459981; AFRL-HE-WP-SR-1998-0004; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459981; Avail.: CASI: A03, Hardcopy

The parameters used to calculate the Dynamic Response (DR - the currently accepted injury criteria for multi-axis impact) for sideward impact are based on a very limited data set. In addition, the current model for spinal injury due to z axis acceleration is based on displacement and cannot account for the effects of off-axis loads. METHODS: Seated, restrained human volunteers were subjected to sideward impacts ranging from 0.031 to 0.250 seconds duration and amplitudes of from 4 to 7 G. Loads were measured at all restraint points and used to calculate dynamic coefficients for a model of upper body response and lumbar spine shear loading. RESULTS: Lumbar spine shear loads can be predicted using a second-order lumped parameter model with a natural frequency of 58 rad/sec and damping ratio of 0.45. CONCLUSIONS: Combining these results with similar models for the x and z axes and correlating then with injury data will allow a comprehensive model of lumbar spinal injury to be produced.
DTIC
Dynamic Loads; Dynamic Response; Impact Acceleration; Injuries; Loads (Forces); Lumbar Region; Spine

20070005339 Systems Research Labs., Inc., Dayton, OH USA
Mass Properties and Inertial Loading Effects of Head Encumbering Devices
Settecerri, Jeffrey J; Mckenzie, Jennifer; Privitzer, Eberhardt; Beecher, Robert M; Dec 1986; 8 pp.; In English
Report No.(s): AD-A459991; AAMRL-TR-88-044; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459991; Avail.: CASI: A02, Hardcopy

The purpose of this investigation is to provide data relevant to the analytical and experimental assessment of the severity of head-neck system loading induced by the protective and performance enhancing equipment worn by today's aviator. Mass properties of various head encumbering devices (e.g., helmets, gas masks, night vision goggles, etc.) have been measured using the automated mass properties measurement system of the U.S. Air Force Armstrong Aerospace Medical Research Laboratory (AAMRL). By using a Hybrid III anthropomorphic manikin head, results were expressed within a standard head anatomical coordinate system. Dynamic tests were conducted on the Air Force 6-inch HYGE vertical impact facility. The repeatable half-sine carriage acceleration for the tests was a profile of 20 G peak acceleration and 50 millisecond duration. Head encumbering devices were mounted onto the Hybrid III manikin head-neck assembly to evaluate inertial loading effects. The procedure for measuring the mass properties is presented along with locations of encumbrance centers of gravity, and principal moments and directions defined within a head anatomical coordinate system for eight different ensembles. HYGE test results of both unencumbered and eight encumbered configurations are also presented. Comparisons are made between two specific fighter gear and chemical defense configurations.
DTIC
Dynamic Loads; Helmets; Impact Acceleration; Inertia; Protective Clothing

20070005508 Veterans Medical Research Foundation, San Diego, CA USA
PR01 - The Effects of Total Sleep Deprivation and Recovery Sleep on Cognitive Performance and Brain Function
Drummond, Sean P; Aug 1, 2006; 57 pp.; In English
Contract(s)/Grant(s): DAMD17-02-1-0201
Report No.(s): AD-A460345; No Copyright; Avail.: CASI: A04, Hardcopy

An ever-increasing number of military personnel and civilians alike must work daily without adequate sleep. Although considerable data show that sleep deprivation alters many aspects of behavior, little is known about changes in the brain substrate underlying the behavioral effects, and even less is known about the cerebral effects of recovery sleep. The overarching objective of this study is to investigate the effects of 2 full nights of sleep loss (66 hours total) and 2 full nights of recovery sleep on cognitive performance and brain function. We have studied 40 individuals for 6 nights and 6 days. Over the course of this period, subjects received 4 polysomnograms and 10 functional magnetic resonance imaging (FMRI) sessions. During the FMRI sessions, functional brain imaging data was collected while subjects performed each of 3 cognitive tasks. These data provide a rich amount of information concerning the effects of prolonged total sleep deprivation and recovery sleep on cognitive performance and the cerebral underpinnings of that performance. Early analyses of these data are revealing the course of deterioration and recovery in cognitive performance, the specific component processes of cognition affected by sleep deprivation, and the changes in brain function associated with sleep deprivation. We have also initially reported distinct patterns of recovery for different sleep parameters after sleep deprivation, and the possibility of using the FMRI measures to identify neural correlates of vulnerability and resilience to sleep deprivation.
DTIC
Brain; Cognition; Mental Performance; Sleep; Sleep Deprivation

53
BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

20070003550 Baker (Wilfred) Engineering, Inc., San Antonio, TX USA
Realistic Modeling of Simple and Complex Cell Tuning in the HMAX Model, and Implications for Invariant Object Recognition in Cortex
Jul 2004; 13 pp.; In English
Contract(s)/Grant(s): N00014-02-1-0915; MDA972-04-1-0037
Report No.(s): AD-A459692; AI-MEMO-2004-017; CBCL-MEMO-239; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Pattern Recognition; Cerebral Cortex; Information Processing (Biology); Models

20070003610 Aerospace Medical Research Labs., Wright-Patterson AFB, OH USA
Investigation of the Effects of Restraint Design Variations on Human Responses to Impact
May 1979; 4 pp.; In English
Report No.(s): AD-A459796; No Copyright; Avail.: CASI: A01, Hardcopy

No abstract available
Constraints; Responses; Impact; Human Factors Engineering

20070004885 Massachusetts Inst. of Tech., Cambridge, MA USA
Sensorimotor Interactions in the Haptic Perception of Virtual Objects
Jan 1997; 197 pp.; In English
Contract(s)/Grant(s): N61339-94-C-0087; N61339-93-C-0083
Report No.(s): AD-A459473; RLE-TR-607; No Copyright; Avail.: CASI: A09, Hardcopy

No abstract available
Sensory Feedback; Sensory Perception; Sensory Stimulation; Touch

20070004890 Massachusetts Inst. of Tech., Cambridge, MA USA
Human Haptic Interaction with Soft Objects: Discriminability, Force Control, and Contact Visualization
Jan 1998; 208 pp.; In English
Contract(s)/Grant(s): N00014-91-J-1454; N00014-92-J-1814
Report No.(s): AD-A459471; RLE-TR-619; No Copyright; Avail.: CASI: A10, Hardcopy

No abstract available
Touch; Sensory Perception; Human Reactions

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*.

20070003500 Space and Naval Warfare Systems Center, San Diego, CA USA

Using Human Systems Integration and Knowledge Engineering to Define and Design Anti-Terrorism/Force Protection Systems and Solutions

Lulue, D; Wilford, G; Gill-Hesselgrave, D; Oct 2006; 69 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459320; SSC/SD-TR-1949; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459320; Avail.: Defense Technical Information Center (DTIC)

This report provides study analyses, findings, and improvement recommendations based on work domain data collected by SSC San Diego and SSC Charleston. 'Worked examples' of how to best use Human Systems Integration (HSI), Knowledge Engineering (KE), Business Process Modeling (BPM), and User-Centered Design (UCD) elements to investigate, model, and re-engineer AT/FP processes are included. The authors' hypothesis throughout their investigations was that by following these processes and applying the principles of HSI, KE, BPM, and UCD, key decision-makers and customers of the acquisition process can make more informed decisions. The report also includes conclusions and recommendations from the SSC San Diego and SSC Charleston team studies.

DTIC

Command and Control; Expert Systems; Human Factors Engineering; Knowledge Representation; Protection; Security; Systems Engineering; Systems Integration; Terrorism; User Requirements

20070003844 Massachusetts Inst. of Tech., Cambridge, MA USA

Observability of Discrete Event Dynamic Systems. Revision

Ozveren, Cuneyt M; Willsky, Alan S; Oct 27, 1989; 42 pp.; In English

Contract(s)/Grant(s): AFOSR-88-0032; DAAL03-86-K-0171

Report No.(s): AD-A458896; LIDS-P-1861-REV; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA458896; Avail.: CASI: A03, Hardcopy

A finite state automaton is adopted as a model for Discrete Event Dynamic Systems (DEDS). Observations are assumed to be a subset of the event alphabet. Observability is defined as having perfect knowledge of the current state at points in time separated by bounded numbers of transitions. A polynomial test for observability is given. It is shown that an observer may be constructed and implemented in polynomial time and space. A bound on the cardinality of the observer state space is also presented. A notion of resiliency is defined for observers, and a test for resilient observability and a procedure for the construction of a resilient observer are presented.

DTIC

Control Theory; Mathematical Models; Dynamic Control

20070004576 Armstrong Lab., Williams AFB, AZ USA

Estimating the Training Effectiveness of Interactive Air Combat Simulation

Feb 1997; 12 pp.; In English

Contract(s)/Grant(s): Proj-1123

Report No.(s): AD-A459625; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Combat; Computerized Simulation; Education; Estimating

20070004578 Armstrong Lab., Williams AFB, AZ USA

Training Benefits of Interactive Air Combat Simulation

Mar 1997; 13 pp.; In English

Contract(s)/Grant(s): Proj-1123

Report No.(s): AD-A459622; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Combat; Computerized Simulation; Education

20070004696 Army Tank-Automotive Research and Development Command, Warren, MI USA
Energy Absorber for Vehicle Occupant Safety and Survivability
Mar 27, 2006; 18 pp.; In English
Report No.(s): AD-A459740; 15547; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Safety; Energy Absorption; Survival; Automobiles

20070004715 Army Tank-Automotive Research and Development Command, Warren, MI USA
Joint Survivability Experiment with Navair
Apr 14, 2005; 8 pp.; In English
Report No.(s): AD-A459732; TARDEC-14751; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Survival; Experimentation

20070005044 Michigan Univ., Ann Arbor, MI USA
Safety and Usability of Speech Interfaces for In-Vehicle Tasks while Driving: A Brief Literature Review
Baron, A.; Green, P.; Feb. 2006; 38 pp.; In English
Report No.(s): PB2007-101959; UMTRI-2006-5; No Copyright; Avail.: CASI: A03, Hardcopy

The report summarizes the human factors literature on the use of speech interfaces for tasks such as music selection, email processing, dialing, and destination entry while driving. A total of 15 papers were reviewed covering 15 experiments, with subject samples ranging from 4 to 48 (mode of 24). Studies were conducted using moderate fidelity simulators, on the road, using low fidelity simulations, and on a test track. The speech interfaces were true speech recognition systems, Wizard-of-Oz simulations, or unspecified.

NTIS

Safety; Verbal Communication

20070005289 Army Aeromedical Research Lab., Fort Rucker, AL USA
A Unified Taxonomic Approach to the Laboratory Assessment of Visionic Devices
Pinkus, Alan R; Rash, Clarence E; Sep 2006; 15 pp.; In English
Contract(s)/Grant(s): Proj-879
Report No.(s): AD-A459901; AARL-2006-14; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459901; Avail.: CASI: A03, Hardcopy

The increased usage of visionic devices necessitates the development of a unified approach to testing and evaluation of such devices. A NATO working group was established to achieve this goal. This presentation describes a taxonomy to classify a given visionic device (based on optical design and display type) and to recommend specific test parameters that should be measured to ensure planned operational performance is delivered in the final product.

DTIC

Display Devices; Helmet Mounted Displays; Night Vision; Optical Properties; Taxonomy

20070005329 Army Research Inst. of Environmental Medicine, Natick, MA USA
Clothing Ventilation Estimates From Manikin Measurements
Berglund, Lary G; Gonzalez, Julio A; Jul 2006; 8 pp.; In English
Report No.(s): AD-A459979; MISC.06-21; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459979; Avail.: CASI: A02, Hardcopy

Clothing ventilation air exchange can be deduced from energy balance results of clothing insulation studies on dry and sweating thermal manikins over a range of air speeds. This paper demonstrates that energy balances at the skin of the clothed dry heated manikin operating in a 20 deg. C 50% RH environment can determine the energy carried away by ventilation air. The volume flow rates are calculated assuming intrinsic insulation is unchanged by air speed and that the ventilation air leaves the clothing system at skin temperature. Similarly energy balances on the clothed sweating manikin operating in a 35 deg. C 50% RH environment (air temperature = skin temperature) can determine the latent energy carried away by the ventilation air assuming the ventilation air leaves saturated. Clothing ventilation rate estimates at three air speeds determined on the dry and

sweating manikin are compared. Demonstration is conducted on military clothing with and without body armour and on fuel handler's protective coverall.
DTIC
Air Flow; Clothing; Estimates; Exchanging; Ventilation

20070005362 Army Research Inst. of Environmental Medicine, Natick, MA USA
Forced Ventilation of Protective Garments for Hot Industries
Gonzalez, Julio A; Berglund, Larry G; Endrusick, Tom L; Kolka, Meg A; Jul 2006; 5 pp.; In English
Report No.(s): AD-A460047; USARIEM-MISC-06-19; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460047; Avail.: CASI: A01, Hardcopy

The performance of a battery powered, forced air distribution system for ventilation under protective clothing (torso body armor) was evaluated on a sweating thermal manikin in a 35 deg C and 50% RH environment. The ventilation system, delivering 9 L dot s(-1) of ambient air increased the heat loss from the manikin by 45 W. Measurements made on the manikin indicated that the ventilation decreased the dry thermal resistance and the vapor resistance of the clothing system by 17 and 20% respectively.
DTIC
Armor; Garments; Industries; Protective Clothing; Ventilation

20070005436 Air Force Research Lab., Wright-Patterson AFB, OH USA
Principles of Fit to Optimize Helmet Sizing
Harrison, Catherine R; Robinette, Kathleen M; May 2006; 18 pp.; In English
Contract(s)/Grant(s): Proj-7184
Report No.(s): AD-A460142; No Copyright; Avail.: CASI: A03, Hardcopy

The present research sought to apply underlying principles that determine helmet fit to develop a scientific design method for determining the minimum number of helmet sizes to accommodate the full anthropometric variability of the population. The method was tested on a prototype helmet concept using a stratified sample of males and females drawn to represent the Joint Strike Fighter population. Asian- and African American subjects were specifically included in order to examine the effects of racial anthropometric variability on fit. While the ranges of accommodation for the initial design was broad, it encompassed only a portion of subjects who fell within the 99% probability ellipse, best meeting the fitting needs of a very small subset of the population. Applying a fit mapping method determined that two helmet sized, sized and shaped differently than those initially proposed and with a modified fitting concept, would accommodate 99% of both males and females. The fit mapping process also provided specific, quantified feedback to the designers on size and shape modifications needed to make the helmet to provide better fit for the full range of the population. Determining the parameters that link anthropometric principles to fit of a specific piece of equipment permit design modifications to equipment to be made early in the design process using only a single size prototype, resulting in fewer sizes while ensuring accommodation of the desired population.
DTIC
Computer Aided Design; Fitting; Helmets; Optimization

20070005442 Air Force Research Lab., Wright-Patterson AFB, OH USA
Two Chapters of Technical Report: Unmanned Military Vehicles - Human Factors of Augmenting the Force Chapter 1: Introduction Chapter 8: Summary: Issues and Conclusions
Draper, Mark; Reising, John; Taylor, Robert; Sep 2006; 19 pp.; In English
Contract(s)/Grant(s): Proj-7184
Report No.(s): AD-A460149; No Copyright; Avail.: CASI: A03, Hardcopy

The terms of Reference (TOR) for the Task Group (TG) lists as its objective to seek to augment the force using uninhabited military vehicles (UMV's) by leveraging the potential advantages of UMV's to act as force multipliers. Since there are no truly uninhabited systems - operators will always be in the loop in some fashion - human factors issues become crucial to the successful operation of these systems. In modern asymmetric warfare, well-organized belligerents ignore the legal requirement under international law to be readily distinguished from the civilian population. They merge with the civilian population, they do not travel in identifiable military vehicles and the use sophisticated deception tactics. Thus, in modern warfare, it is very difficult for an autonomous machine to discriminate between civilians and military targets.
DTIC
Deception; Human Factors Engineering; Human Performance; Tactics; Teams

20070005491 Naval Postgraduate School, Monterey, CA USA

Industry Analysis for Body Armor Procurement

Foust, Coleen; Jenson, Christopher; Dec 2006; 97 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460317; No Copyright; Avail.: CASI: A05, Hardcopy

In order to leverage buying power, reduce costs and improve supplier management, the USA Air Force (USAF) needs to take a strategic approach to acquiring goods and services. Both academic and business literature promotes strategic sourcing as a viable method of minimizing cost and guarding against materials disruptions. In addition, the Office of Management and Budget has required that each agency create strategic sourcing initiatives, monitor the cost savings and report the results to the Office of Federal Procurement Policy. However, utilization of strategic sourcing techniques and processes within the USAF is relatively new and its full benefit has not been realized. Continued efforts by the USAF to integrate strategic sourcing into its acquisition processes will yield further cost savings and other related supply chain improvements. To assist with improving the strategic sourcing efforts of the USAF, this research seeks to identify viable methodologies for conducting industry analysis. This is important and relevant because conducting an industry analysis is a critical step toward developing an effective sourcing strategy.

DTIC

Armor; Government Procurement; Industries; Procurement

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*.

20070003577 Maribor Univ., Maribor, Slovenia

Statistical Alignment Models in Machine Translation from Slovenian to English

Maucec, Mirjam Sepesy; Brest, Janez; Kacic, Zdravko; Electrotechnical Review, Volume 73, No. 5; 2006, pp. 273-278; In English; See also 20070003567; Copyright; Avail.: Other Sources

This paper deals with statistical machine translation. The quality of translation system strongly depends on characteristics of the training corpus. In this paper we address the problem of very sparse training corpora. In languages with a very rich morphology, learning methods suffer from a significant sparseness problem. We present and compare various statistical models for computing word alignments that are the core of any translation model. The basic idea is to find a suitable training schedule for a specific task in terms of computing the ‘optimal’ number of iterations for each translation model. For this purpose experiments are shown having been done on the IJS-ELAN bilingual corpus. We show that from the point of view of pure statistical translation the extent of data sparsity would most likely make such optimization impossible.

Author

Alignment; Machine Translation; Mathematical Models; Words (Language); Linguistics; Statistical Analysis

20070003607 Mitre Corp., Bedford, MA USA

JPEG 2000 and WSQ Image Compression Interoperability

Feb 2001; 53 pp.; In English

Contract(s)/Grant(s): DAAB07-00-C-C201

Report No.(s): AD-A459568; MTR-00B0000063; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available

Data Compression; Image Processing; Interoperability

20070003631 Massachusetts Inst. of Tech., Cambridge, MA USA

Realization Theory for Deterministic Boundary-Value Descriptor Systems

Jun 1989; 16 pp.; In English

Contract(s)/Grant(s): AFOSR-88-0032

Report No.(s): AD-A459684; LIDS-P-1879; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Boundary Value Problems; Systems Engineering; Applications of Mathematics

20070003695 Army Tank-Automotive and Armaments Command, Warren, MI USA
Monte Carlo Evaluation of an Iterative Technique for the Design of Observer Field Tests
Apr 2002; 7 pp.; In English
Report No.(s): AD-A459616; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Field Tests; Monte Carlo Method; Iteration

20070003724 Massachusetts Inst. of Tech., Cambridge, MA USA
A Multiscale Approach to Solving One Dimensional Inverse Problems
Jan 1992; 5 pp.; In English
Contract(s)/Grant(s): N00014-91-J-1004; DAAL03-92-G-0115
Report No.(s): AD-A459602; LIDS-P-2121; No Copyright; Avail.: CASI: A01, Hardcopy

No abstract available

Inversions; Wavelet Analysis

20070003750 Massachusetts Inst. of Tech., Cambridge, MA USA
PAC Learning with Generalized Samples and an Application to Stochastic Geometry
Jun 1991; 19 pp.; In English
Contract(s)/Grant(s): DAAL03-86-K-0171; F19628-90-C-0002
Report No.(s): AD-A459600; LIDS-P-2044; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Education; Stochastic Processes; Geometry

20070003752 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Query-Driven Network Flow Data Analysis and Visualization. Final Report
Bethel, E. W.; Jun. 14, 2006; 4 pp.; In English
Report No.(s): DE2006-888963; No Copyright; Avail.: Department of Energy Information Bridge

This document is the final report for a limited-scope and duration project conducted through Lawrence Berkeley National Laboratory’s (LBNL) Work-For-Others (WFO) program for the National Visualization and Analytics Center (NVAC) at Pacific Northwest National Laboratory (PNNL). The original statement of work, submitted and accepted in February 2005, focused on architectural issues for a broad analytics data processing framework. The statement of work was revised and accepted on approximately September 2005 and the work period extended through June 2006. The new statement of work focused on ‘analytics research’ for new capabilities that would enable rapid analysis and visualization of large collections of Network Flow data. This document is the final report and deliverable for the project.
NTIS

Data Management; Flow Visualization; Network Analysis

20070003767 Massachusetts Inst. of Tech., Cambridge, MA USA
Active Learning Using Arbitrary Binary Valued Queries
Oct 1990; 13 pp.; In English
Contract(s)/Grant(s): DAAL03-06-K-0171; F19628-90-C-0002
Report No.(s): AD-A459598; LIDS-P-1996; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Education; Learning; Digital Systems

20070003770 Massachusetts Inst. of Tech., Cambridge, MA USA
A Framework for Non-Gaussian Signal Modeling and Estimation
Jun 1999; 240 pp.; In English
Contract(s)/Grant(s): F49620-96-1-0072; DAAL01-06-2-0001
Report No.(s): AD-A459597; RLE-TR-626; No Copyright; Avail.: CASI: A11, Hardcopy

No abstract available

Signal Processing; Estimating

20070003776 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Survey of Codes and Algorithms Used in NERSC Material Science Allocations
Wang, L. W.; January 2006; 12 pp.; In English
Report No.(s): DE2006-887444; No Copyright; Avail.: National Technical Information Service (NTIS)

We have carried out a survey of codes and algorithms used on NERSC computers within the science category of material science. This is part of the effort to track the usage of different algorithms in NERSC community. This survey is based on the data provided in the ERCAP application of FY06. To figure out the usage of each code in one account, we have multiplied the total high performance computer (HPC) time allocation (MPP hours) of this account with the percentage usage of this code as estimated by the users in the ERCAP application. This is not the actual usage time, but should be a good estimation of it, and it represents the intention of the users.

NTIS

Algorithms; Allocations; Computers; Surveys

20070003785 Lawrence Livermore National Lab., Livermore, CA USA
Parallel Computer Implementation of Fast Low-Rank QR Approximation of the Biot-Savart Law
White, D. A.; Fasenfest, B. J.; Stowell, M. L.; Nov. 10, 2005; 12 pp.; In English
Report No.(s): DE2006-887290; UCRL-CONF-216989; No Copyright; Avail.: National Technical Information Service (NTIS)

In this paper we present a low-rank QR method for evaluating the discrete Biot-Savart law on parallel computers. It is assumed that the known current density and the unknown magnetic field are both expressed in a finite element expansion, and we wish to compute the degrees-of-freedom (DOF) in the basis function expansion of the magnetic field. The matrix that maps the current DOF to the field DOF is full, but if the spatial domain is properly partitioned the matrix can be written as a block matrix, with blocks representing distant interactions being low rank and having a compressed QR representation. The matrix partitioning is determined by the number of processors, the rank of each block (i.e. the compression) is determined by the specific geometry and is computed dynamically. In this paper we provide the algorithmic details and present computational results for large-scale computations.

NTIS

Biot-Savart Law; Computers; Parallel Computers

20070003799 Massachusetts Inst. of Tech., Cambridge, MA USA
Variable Background Born Inversion by Wavefield Backpropagation
Nov 1986; 47 pp.; In English
Contract(s)/Grant(s): DAAG29-84-K-0005; AFOSR-85-0227
Report No.(s): AD-A459595; LIPS-P-1536; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Backpropagation (Artificial Intelligence); Neural Nets; Inversions

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20070003806 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
High Performance Visualization using Query-Driven Visualization and Analytics
Bethel, E. W.; Campbell, S.; Dart, E.; Shalf, J.; Stockinger, K.; January 2006; 2 pp.; In English
Report No.(s): DE2006-888965; No Copyright; Avail.: National Technical Information Service (NTIS)

Query-driven visualization and analytics is a unique approach for high-performance visualization that offers new capabilities for knowledge discovery and hypothesis testing. The new capabilities--akin to finding needles in haystacks--are the result of combining technologies from the fields of scientific visualization and scientific data management. This approach is crucial for rapid data analysis and visualization in the petascale regime. This article describes how query-driven visualization is applied to a ‘hero-sized’ network traffic analysis problem.

NTIS

Data Management; Scientific Visualization; Query Languages

20070003815 SRI International Corp., Menlo Park, CA USA
Application of Theorem Proving to Problem Solving
Mar 1969; 23 pp.; In English
Contract(s)/Grant(s): F30602-69-C-0056; AF30602-4147
Report No.(s): AD-A459656; SRI-TR-4; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Problem Solving; Theorem Proving

20070003818 SRI International Corp., Menlo Park, CA USA
A Probabilistic Model for Uncertain Problem Solving
Dec 1981; 49 pp.; In English
Contract(s)/Grant(s): N00014-81-C-0115
Report No.(s): AD-A458836; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Problem Solving; Probability Theory; Mathematical Models

20070003858 Massachusetts Inst. of Tech., Cambridge, MA USA
Asymptotic Orders of Reachability in Perturbed Linear Systems
Aug 1987; 40 pp.; In English
Contract(s)/Grant(s): AFOSR-82-0258; DAAG-29-84-K-0005
Report No.(s): AD-A459592; LIDS-P-1698; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Linear Systems; Perturbation; Asymptotic Methods

20070003883 Stanford Univ., Stanford, CA USA
Large Deviations and Applications: The Finite Dimensional Case
Apr 1991; 100 pp.; In English
Contract(s)/Grant(s): AFOSR-89-0276B
Report No.(s): AD-A459540; LIDS-R-2030; No Copyright; Avail.: CASI: A05, Hardcopy

No abstract available

Statistical Analysis; Deviation; Applications of Mathematics

20070003887 Army Engineer Research and Development Center, Vicksburg, MS USA
Grid Nesting with STWAVE
Jun 2002; 11 pp.; In English
Report No.(s): AD-A459646; ERDC/CHL CHETN-1-66; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Grid Computing (Computer Networks); Grid Generation (Mathematics); Computational Grids

20070003914 Washington Univ., Seattle, WA USA
Model-Based Clustering for Image Segmentation and Large Datasets Via Sampling
Feb 13, 2003; 27 pp.; In English
Contract(s)/Grant(s): N00014-01-10745; NIH-IR01CA094212-01
Report No.(s): AD-A459638; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Imaging Techniques; Sampling; Data Bases; Cluster Analysis

20070004556 Massachusetts Inst. of Tech., Cambridge, MA USA
On the Relation of Anticipative Stratonovich and Symmetric Integrals: A Decomposition Formula
Feb 1988; 12 pp.; In English
Contract(s)/Grant(s): AFOSR-85-0227-B
Report No.(s): AD-A459634; LIDS-P-1743; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Decomposition; Integrals; Symmetry

20070004563 Massachusetts Inst. of Tech., Cambridge, MA USA
Some Issues in Distributed Asynchronous Routing in Virtual Circuit Data Networks
Sep 1986; 4 pp.; In English
Contract(s)/Grant(s): ECS-8217668
Report No.(s): AD-A459631; LIDS-P-1601; No Copyright; Avail.: CASI: A01, Hardcopy

No abstract available

Circuits; Synchronism; Computer Networks; Distributed Processing

20070004575 Massachusetts Inst. of Tech., Cambridge, MA USA
Neural Mechanisms of Object Recognition
Jan 2002; 8 pp.; In English
Report No.(s): AD-A459627; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Pattern Recognition; Neural Nets; Image Analysis

20070004580 Army Tank-Automotive and Armaments Command, Warren, MI USA
Game Theory and Trade-Off Analysis
Mar 27, 2006; 11 pp.; In English
Report No.(s): AD-A459731; TACOM-15629; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Game Theory; Tradeoffs

20070004689 Arizona State Univ., Tempe, AZ USA
Verification Test Problems for the Calculation of Probability of Loss of Assured Safety in Temperature-Dependent Systems with Multiple Weak and Strong Links
Helton, J. C.; Johnson, J. D.; Oberkampf, W. L.; January 2006; 52 pp.; In English
Report No.(s): DE2006-887251; SAND2006-2785; No Copyright; Avail.: Department of Energy Information Bridge

Four verification test problems are presented for checking the conceptual development and computational implementation of calculations to determine the probability of loss of assured safety (PLOAS) in temperaturedependent systems with multiple weak links (WLs) and strong links (SLs). The problems are designed to test results obtained with the following definitions of loss of assured safety: (i) Failure of all SLs before failure of any WL, (ii) Failure of any SL before failure of any WL, (iii) Failure of all SLs before failure of all WLs, and (iv) Failure of any SL before failure of all WLs. The test problems are based on assuming the same failure properties for all links, which results in problems that have the desirable properties of fully exercising the numerical integration procedures required in the evaluation of PLOAS and also possessing simple algebraic representations for PLOAS that can be used for verification of the analysis.

NTIS

Losses; Probability Theory; Proving; Safety; Temperature Dependence

20070004694 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Scientific Data Management Center
Shoshani, A.; Jun. 2006; 6 pp.; In English
Report No.(s): DE2006-886956; LBNL/PUB-964; No Copyright; Avail.: National Technical Information Service (NTIS)

With the increasing volume and complexity of data produced by ultra-scale simulations and high-throughput experiments, understanding the science is largely hampered by the lack of comprehensive, end-to-end data management solutions ranging from initial data acquisition to final analysis and visualization. The Scientific Data Management (SDM) Center is bringing a set of advanced data management technologies to DOE scientists in various application domains including astrophysics, climate, fusion, and biology. Equally important, it has established collaborations with these scientists to better understand their science as well as their forthcoming data management and data analytics challenges. The SDM center has provided advanced data management technologies to DOE domain scientists in the areas of storage efficient access, data mining and analysis, and scientific process automation.

NTIS

Data Management; End-to-End Data Systems; Technology Utilization; Science

20070004695 Sandia National Labs., Albuquerque, NM USA
Sensitivity in Risk Analyses with Uncertain Numbers
Ferson, S.; Tucker, W.; Jul. 2006; 86 pp.; In English
Report No.(s): DE2006-886899; SAND2006-2801; No Copyright; Avail.: National Technical Information Service (NTIS)

Sensitivity analysis is a study of how changes in the inputs to a model influence the results of the model. Many techniques have recently been proposed for use when the model is probabilistic. This report considers the related problem of sensitivity analysis when the model includes uncertain numbers that can involve both aleatory and epistemic uncertainty and the method of calculation is Dempster-Shafer evidence theory or probability bounds analysis. Some traditional methods for sensitivity analysis generalize directly for use with uncertain numbers, but, in some respects, sensitivity analysis for these analyses differs from traditional deterministic or probabilistic sensitivity analyses.
NTIS
Risk; Sensitivity Analysis; Number Theory; Uncertain Systems

20070004707 Oak Ridge National Lab., TN USA, Wisconsin Univ., Madison, WI, USA
Using Pin as a Memory Reference Generator for Multiprocessor Simulation
McCurdy, C.; Fischer, C.; January 2006; 10 pp.; In English
Report No.(s): DE2006-886014; No Copyright; Avail.: National Technical Information Service (NTIS)

In this paper we describe how we have used Pin to generate a multithreaded reference stream for simulation of a multiprocessor on a uniprocessor. We have taken special care to model as accurately as possible the effects of cache coherence protocol state, and lock and barrier synchronization on the performance of multithreaded applications running on multiprocessor hardware. We first describe a simplified version of the algorithm, which uses semaphores to synchronize instrumented application threads and the simulator on every memory reference. We then describe modifications to that algorithm to model the microarchitectural features of the Itanium2 that affect the timing of memory reference issue. An experimental evaluation determines that while cycle-accurate multithreaded simulation is possible using our approach, the use of semaphores has a negative impact on the performance of the simulator.
NTIS
Multiprocessing (Computers); Simulation; Memory (Computers); Synchronism

20070004709 Army Tank-Automotive Research and Development Command, Warren, MI USA
New Real-time Modeling and Simulation Products and Applications
May 9, 2005; 7 pp.; In English
Report No.(s): AD-A459734; TARDEC-14917; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available
Computerized Simulation; Real Time Operation; Utilization

20070004722 Massachusetts Inst. of Tech., Cambridge, MA USA
A Distributed and Iterative Method for Square Root Filtering in Space-Time Estimation
Jan 19, 1994; 29 pp.; In English
Contract(s)/Grant(s): F49620-92-J-002; N00014-91-J-1120
Report No.(s): AD-A459794; LIDS-P-2226; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Space-Time Functions; Estimating; Iteration; Distributed Parameter Systems

20070004725 Washington Univ., Seattle, WA USA
Bayesian Inference for Color Image Quantization via Model-Based Clustering Trees
Nov 2, 2001; 23 pp.; In English
Contract(s)/Grant(s): N00014-96-1-0192
Report No.(s): AD-A459791; TR-402; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Bayes Theorem; Color; Inference; Cluster Analysis; Measurement

20070004729 Army Tank-Automotive and Armaments Command, Warren, MI USA
Vector-Valued Support Vector Regression
Apr 14, 2006; 9 pp.; In English
Report No.(s): AD-A459789; TACOM-15692; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Vector Analysis; Vectors (Mathematics); Regression Analysis

20070004731 Royal Inst. of Tech., Stockholm, Sweden
Average Volume of a Random Tetrahedron in a Tetrahedron
Philip, J.; Mar. 13, 2006; 34 pp.; In English
Report No.(s): PB2007-103376; TRITA-MAT-06-MA-02; No Copyright; Avail.: CASI: A03, Hardcopy

We calculate the average size of the volume of a random tetrahedron inside a mother tetrahedron. The result is not new, but the method is different from that of previous papers.
NTIS
Tetrahedrons; Volume; Geometry

20070004786 Colorado Univ., Boulder, CO USA
Hemingway, A Distributed Shared Memory System
Mar 23, 1995; 18 pp.; In English
Contract(s)/Grant(s): DABT63-94-C-0029; NSF-ASC-9217394
Report No.(s): AD-A459176; CU-CS-813-96; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Distributed Memory; Memory (Computers)

20070004818 Massachusetts Inst. of Tech., Cambridge, MA USA
A Technique for Speeding Up the Solution of the Lagrangean Dual
Apr 10, 1991; 32 pp.; In English
Contract(s)/Grant(s): AFOSR-88-0088
Report No.(s): AD-A459506; OR-248-91; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Algorithms; Relaxation Method (Mathematics); Polynomials; Linear Programming; Lagrangian Function

20070004860 Technische Univ., Munich, Germany
Choosing the Link Function and Accounting for Link Uncertainty in Generalized Linear Models using Bayes Factors
Oct 16, 2001; 25 pp.; In English
Contract(s)/Grant(s): N00014-96-1-1092
Report No.(s): AD-A459482; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Bayes Theorem; Links; Uncertain Systems; Linear Systems

20070004867 Massachusetts Inst. of Tech., Cambridge, MA USA
Lyapunov Exponents for Filtering Problems
Apr 1988; 15 pp.; In English
Contract(s)/Grant(s): AFOSR-85-0227B
Report No.(s): AD-A459564; LIDS-P-1764; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Exponents; Liapunov Functions

20070004868 Purdue Univ., West Lafayette, IN USA
On Sampling Methods and Annealing Algorithms
Dec 1990; 15 pp.; In English
Contract(s)/Grant(s): ECS-8910073; 89-0276B
Report No.(s): AD-A459479; LIDS-P-2008; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Algorithms; Annealing; Sampling

20070004874 Massachusetts Inst. of Tech., Cambridge, MA USA
A Canonical Correlations Approach to Multiscale Stochastic Realization
Nov 1996; 41 pp.; In English
Contract(s)/Grant(s): F49620-03-1-0604; DAAL03-92-G-0015
Report No.(s): AD-A459475; LIDS-P-2372; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Correlation; Stochastic Processes

20070004893 California Univ., Santa Cruz, CA USA
A Novel Group Coordination Protocol for Collaborative Multimedia Systems
Jan 1998; 7 pp.; In English
Contract(s)/Grant(s): F19628-96-C-0038
Report No.(s): AD-A459469; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Coordination; Multimedia; Protocol (Computers)

20070004900 Carnegie-Mellon Univ., Pittsburgh, PA USA
A Media-Independent Content Language for Integrated Text and Graphics Generation
Jan 1998; 8 pp.; In English
Contract(s)/Grant(s): DAA1593-K-0005
Report No.(s): AD-A459464; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Texts; Language Programming; Computer Graphics

20070004902 Massachusetts Inst. of Tech., Cambridge, MA USA
Proof of Correctness of Proposed ATM Retransmission Scheme
Aug 1993; 20 pp.; In English
Report No.(s): AD-A459501; LIDS-P-2191; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Proving; Correction

20070004913 Baker (Wilfred) Engineering, Inc., San Antonio, TX USA
Stimulus Simplification and Object Representation: A Modeling Study
Mar 2002; 9 pp.; In English
Contract(s)/Grant(s): N00014-00-1-0907; IIS-0085836
Report No.(s): AD-A459496; AL MEMO-2002-004; CBCL MEMO-215; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Simplification; Stimuli; Object-Oriented Programming

20070004915 Johns Hopkins Univ., Baltimore, MD USA
Hierarchical Reconstruction Using Geometry and Sinogram Restoration
Jan 1991; 53 pp.; In English
Contract(s)/Grant(s): N00014-91-J-1004; DAAL03-86-K-0171
Report No.(s): AD-A459493; LIDS-P-2094; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available

Hierarchies; Restoration; Geometry

20070004916 Maryland Univ., College Park, MD USA
A Parallel Line Detection Algorithm Based on HMM Decoding
Dec 2003; 29 pp.; In English
Contract(s)/Grant(s): MDA-9040-2C-0406
Report No.(s): AD-A459492; LAMP-TR-109; CAR-TR-994; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Algorithms; Decoding; Detection

20070004917 Massachusetts Inst. of Tech., Cambridge, MA USA

Aggregation and Multi-Level Control in Discrete Event Dynamic Systems

Aug 1989; 55 pp.; In English

Contract(s)/Grant(s): AFOSR-88-0032; DAAI03-80-K0171

Report No.(s): AD-A459491; LIDS-P-1902; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available

Discrete Functions; Dynamic Characteristics; Control

20070004918 Massachusetts Inst. of Tech., Cambridge, MA USA

Output Stabilizability of Discrete Event Dynamic Systems

Jun 21, 1989; 50 pp.; In English

Contract(s)/Grant(s): AFOSR-88-0032; DAAL03-86-K-0171

Report No.(s): AD-A459490; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Stabilization; Stability Tests; Output; Discrete Functions; Dynamic Stability

20070004950 Department of Justice, Washington, DC, USA

Privacy Technology Focus Group: Executive Summary

January 2006; 8 pp.; In English

Report No.(s): PB2007-103617; No Copyright; Avail.: CASI: A02, Hardcopy

On November 1-3, 2005, after weeks of preparatory analysis, the carefully selected group of practitioners, policymakers, and technologists met in Phoenix, Arizona, to identify existing and emerging technologies to support justice-related privacy policies. Focus Group members: - Identified what they considered to be the most important issues in privacy policy and technology. - Narrowed the focus to areas that could be adequately addressed in the given timeframe. - Outlined tangible, targeted technology solutions. - Developed specific recommendations for action.

NTIS

Privacy; Policies; Technology Assessment

20070004952 Department of Justice, Washington, DC, USA

Privacy Technology Focus Group: Final Report and Recommendations

January 2006; 83 pp.; In English

Report No.(s): PB2007-103616; No Copyright; Avail.: CASI: A05, Hardcopy

On November 1-3, 2005, after weeks of preparatory analysis, the carefully selected group of practitioners, policymakers, and technologists met in Phoenix, Arizona, to identify existing and emerging technologies to support justice-related privacy policies. Focus Group members: - Identified what they considered to be the most important issues in privacy policy and technology. - Narrowed the focus to areas that could be adequately addressed in the given timeframe. - Outlined tangible, targeted technology solutions. - Developed specific recommendations for action.

NTIS

Privacy; Policies; Technology Assessment

20070004984 Lawrence Livermore National Lab., Livermore, CA USA

Birds of a Feather: Supporting Secure Systems

Braswell, H. V.; Apr. 24, 2006; 24 pp.; In English

Report No.(s): DE2006-889430; UCRL-CONF-220869; No Copyright; Avail.: Department of Energy Information Bridge

Over the past few years Lawrence Livermore National Laboratory has begun the process of moving to a diskless environment in the Secure Computer Support realm. This movement has included many moving targets and increasing support complexity. We would like to set up a forum for Security and Support professionals to get together from across the Complex and discuss current deployments, lessons learned, and next steps. This would include what hardware, software, and hard copy based solutions are being used to manage Secure Computing. The topics to be discussed include but are not limited to: Diskless computing, port locking and management, PC, Mac, and Linux/UNIX support and setup, system imaging, security setup documentation and templates, security documentation and management, customer tracking, ticket tracking, software download

and management, log management, backup/disaster recovery, and mixed media environments.
NTIS
Computer Information Security; Artificial Intelligence

20070005028 National Inst. of Standards and Technology, Gaithersburg, MD, USA
Assessment of Access Control Systems
Hu, V. C.; Ferraiolo, D. F.; Kuhn, D. R.; Sep. 2006; 60 pp.; In English
Report No.(s): PB2007-104342; NISTIR-7316; No Copyright; Avail.: CASI: A04, Hardcopy

Adequate security of information and information systems is a fundamental management responsibility. Nearly all applications that deal with financial, privacy, safety, or defense include some form of access control. Access control is concerned with determining the allowed activities of legitimate users, mediating every attempt by a user to access a resource in the system. In some systems, complete access is granted after successful authentication of the user, but most systems require more sophisticated and complex control. In addition to the authentication mechanism (such as a password), access control is concerned with how authorizations are structured. In some cases, authorization may mirror the structure of the organization, while in others it may be based on the sensitivity level of various documents and the clearance level of the user accessing those documents. This publication explains some of the commonly used access control services available in information technology systems.
NTIS
Access Control; Information Systems; Security

20070005029 National Inst. of Standards and Technology, Gaithersburg, MD, USA
Personal Identity Verification Demonstration Summary
McCallister, E.; Ferraiolo, H.; Aug. 2006; 19 pp.; In English
Report No.(s): PB2007-104341; NISTIR-7337; No Copyright; Avail.: CASI: A03, Hardcopy

On August 27, 2004, the President signed Homeland Security Presidential Directive 12 (HSPD-12), entitled ‘Policy for a Common Identification Standard for Federal Employees and Contractors.’ HSPD-12 required the development and implementation of a government-wide standard for secure and reliable forms of identification for Federal employees and contractors. As required by HSPD-12, the National Institute of Standards and Technology (NIST) issued Federal Information Processing Standard 201 (FIPS 201). To ensure interoperability, NIST created a conformance test suite for Personal Identity Verification (PIV) card applications and middleware, which is being used by independent laboratories to conduct the conformance testing. With the October 27, 2006, deadline for agencies to implement FIPS 201 fast approaching, NIST sought voluntary participation by companies offering products and services supporting FIPS 201 for the PIV Demonstration. The PIV Demonstration provided NIST the opportunity to conduct proof of concept and interoperability demonstrations of products supporting FIPS 201 and accompanying Special Publications. The demonstration resulted in a useful exchange of information among Federal agencies, vendors, and NIST.
NTIS
Contractors; Identities; Information Systems; Particle Image Velocimetry; Personnel

20070005034 North Carolina Univ., Chapel Hill, NC, USA
Frontiers in Evolutionary Biology. Report of a Workshop
Mar. 2005; 16 pp.; In English; Frontiers in Evolutionary Biology. Report of a Workshop., March 2005, USA
Contract(s)/Grant(s): NSF-DEB-0500314
Report No.(s): PB2007-104327; No Copyright; Avail.: CASI: A03, Hardcopy

In reflecting on research frontiers that have emerged since 1998, two related trends are evident. First, evolutionary approaches and perspectives are increasingly an integral part of all areas of biological research, from molecular biology to macroecology. As a result, we are increasingly able to explore the mechanisms, processes and patterns of evolutionary change at multiple levels of biological organization from the gene to the ecosystem. Second, technological advances in genomics, computation, and informatics have provided a world of new tools and information to apply to evolutionary questions.
NTIS
Biological Evolution; Molecular Biology; Ecosystems; Computation

20070005037 Children’s Bureau, Washington, DC, USA
Disclosure of Confidential Child Abuse and Neglect: Summary of State Laws
Apr. 2005; 71 pp.; In English
Report No.(s): PB2007-104316; No Copyright; Avail.: CASI: A04, Hardcopy

The records of child abuse and neglect reports are maintained by State child protection or social services agencies to aid in the investigation, treatment, and prevention of child abuse cases and to maintain statistical information for staffing and funding purposes. In many States, these records and the results of investigations are maintained in databases, often known as central registries. The type of information contained in registry and department records varies from State to State, as does access to the information maintained.

NTIS

Laws; Protection; Prevention

20070005047 Fish and Neve IP Group, Boston, MA, USA

Motion-Based Visualization, Part Two

Bobrow, R. J.; Roberts, R. B.; Ware, C.; Pickett, R. M.; 10 May 06; 16 pp.; In English

Contract(s)/Grant(s): NMA 401-01-C-0019

Patent Info.: Filed Filed 10 May 06; US-Patent-Appl-SN-11-431 678

Report No.(s): PB2007-101416; No Copyright; Avail.: CASI: A03, Hardcopy

A data-display system employs a display in which the representations of data objects are caused to move on the display in order to convey information about the represented data objects. In one example, icons in a link-analysis display that represent data objects satisfying a selection criterion are made to execute distinctive motion. In another example, three-dimensional models of moving bodies in whose features components of respective data objects are encoded are projected onto a screen plane, and the resultant values are used to generate the display.A data-display system employs a display in which the representations of data objects are caused to move on the display in order to convey information about the represented data objects. In one example, icons in a link-analysis display that represent data objects satisfying a selection criterion are made to execute distinctive motion. In another example, three-dimensional models of moving bodies in whose features components of respective data objects are encoded are projected onto a screen plane, and the resultant values are used to generate the display.

NTIS

Display Devices; Patent Applications; Data Systems

20070005052 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA

Concurrent Single-Executable CCSM with MPH Library

He, Y.; Ding, C.; May 2006; 6 pp.; In English

Report No.(s): DE2006-888986; No Copyright; Avail.: Department of Energy Information Bridge

Community Climate System Model (CCSM) is currently a multi-executable system based on the Multi-Program Multi-Data (MPMD) mechanism. Each component is compiled into a separate executable. MPMD is normally cumbersome in usage and vendor support is sometimes limited or completely unavailable, such as on BlueGene/L. Also smaller groups and institutions would like to run CCSM locally, rather than relying on large computer centers. So, single-executable CCSM is under request. We are developing a multi-executable and single-executable coexisting version of CCSM. In single-executable, each component is organized as a subroutine, which is called from a master program. Different components run simultaneously. This is accomplished by redesigning the top level CCSM structures using the Multi-Program Handshaking (MPH) library.

NTIS

Climate Models; Computerized Simulation; Libraries

20070005055 Princeton Univ., NJ, USA

Nonlinear Dynamical Systems

January 2006; 10 pp.; In English

Report No.(s): DE2006-888778; No Copyright; Avail.: Department of Energy Information Bridge

This award is approaching the end of a second and final year of no-cost extension, and the following is the final report on the work completed since the start of the second renewal period: Jan 1, 2001 It supplements the annual reports submitted in 2001 and 2002. In the renewal proposal I envisaged work in three main areas: 1. Analytical and topological tools for studying flows and maps; 2. Low dimensional models of fluid flow; 3. Models of animal locomotion.

NTIS

Dynamical Systems; Nonlinear Systems

20070005063 Fish and Neve IP Group, Boston, MA, USA

Motion-Based Visualization, Part One

Bobrow, R. J.; Roberts, R. B.; Ware, C.; Pickett, R. M.; 9 May 06; 16 pp.; In English

Contract(s)/Grant(s): NMA 401-01-C-0019

Patent Info.: Filed Filed 9 May 06; US-Patent-Appl-SN-11-431 338

Report No.(s): PB2007-101415; No Copyright; Avail.: CASI: A03, Hardcopy

A data-display system employs a display in which the representations of data objects are caused to move on the display in order to convey information about the represented data objects. In one example, icons in a link-analysis display that represent data objects satisfying a selection criterion are made to execute distinctive motion. In another example, three-dimensional models of moving bodies in whose features components of respective data objects are encoded are projected onto a screen plane, and the resultant values are used to generate the display.

NTIS

Display Devices; Data Systems

20070005071 Pacific Northwest National Lab., Richland, WA, USA

PNNL OS3700 Tritium Monitoring System Software and Hardware Operations Manual Rev. 0

Barnett, J. M.; Duchsherer, D. J.; Sisk, D. R.; Carrell, D. M.; Carrell, D. D.; Nov. 2005; 47 pp.; In English

Report No.(s): DE2006-889091; PNNL-15491; No Copyright; Avail.: National Technical Information Service (NTIS)

The PNNL OS3700 Tritium Monitoring System Software and Hardware Operations Manual describes herein how to install and operate the software and hardware on a personal computer in conjunction with the Berthold LB110 flow-through proportional counter detector system. Included are operational details for the software functions, how to read and use the drop-down menus, how to understand readings and calculations, and how to access the database tables. The tritium stack monitoring system is controlled by a personal computer (PC) and measures tritium concentration in real time. It consists of the data acquisition system (OS3700 software) designed solely for use with the Berthold LB110 flow-through proportional counter detector system, a pump, and the detector system. The software and the associated acquisition electronics are not intended for use with any other instrument.

NTIS

Computer Programs; Computers; Proportional Counters; Tritium

20070005081 College of William and Mary, Williamsburg, VA, USA, Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA

Efficient Subtorus Processor Allocation in a Multi-Dimensional Torus

Mao, W.; Chen, J.; Watson, W.; January 2006; 12 pp.; In English

Report No.(s): DE2006-887122; No Copyright; Avail.: Department of Energy Information Bridge

Processor allocation in a mesh or torus connected multicomputer system with up to three dimensions is a hard problem that has received some research attention in the past decade. With the recent deployment of multicomputer systems with a torus topology of dimensions higher than three, which are used to solve complex problems arising in scientific computing, it becomes imminent to study the problem of allocating processors of the configuration of a torus in a multi-dimensional torus connected system. In this paper, we first define the concept of a semitorus. We present two partition schemes, the Equal Partition (EP) and the Non-Equal Partition (NEP), that partition a multi-dimensional semitorus into a set of sub-semitori. We then propose two processor allocation algorithms based on these partition schemes.We evaluate our algorithms by incorporating them in commonly used FCFS and backfilling scheduling policies and conducting simulation using workload traces from the Parallel Workloads Archive. Specifically, our simulation experiments compare four algorithm combinations, FCFS/EP, FCFS/NEP, backfilling/EP, and backfilling/NEP, for two existing multi-dimensional torus connected systems. The simulation results show that our algorithms (especially the backfilling/NEP combination) are capable of producing schedules with system utilization and mean job bounded slowdowns comparable to those in a fully connected multicomputer.

NTIS

Toruses; Multiprocessing (Computers); Algorithms

20070005127 Lawrence Livermore National Lab., Livermore, CA USA

Size Selection Initiation Model Extended to Include Shape and Random Factors

Trenholme, J. B.; Feit, M. D.; Rubenchik, A. M.; Nov. 08, 2005; 20 pp.; In English

Report No.(s): DE2006-886665; No Copyright; Avail.: Department of Energy Information Bridge

The Feit-Rubenchik size-selection damage model has been extended in a number of ways. More realistic thermal deposition profiles have been added. Non-spherical shapes (rods and plates) have been considered, with allowance for their orientation dependence. Random variations have been taken into account. An explicit form for the change of absorptivity with precursor size has been added. A simulation tool called GIDGET has been built to allow adjustment of the many possible parameters in order to fit experimental data of initiation density as a function of fluence and pulse duration. The result is a set of constraints on the possible properties of initiation precursors.

NTIS

Deposition; Shapes; Mathematical Models

20070005140 Sandia National Labs., Albuquerque, NM USA

Model Reduction of Systems with Localized Nonlinearities

Segalman, D. J.; Mar. 2006; 70 pp.; In English

Report No.(s): DE2006-886648; No Copyright; Avail.: Department of Energy Information Bridge

An LDRD funded approach to development of reduced order models for systems with local nonlinearities is presented. This method is particularly useful for problems of structural dynamics, but has potential application in other fields. The key elements of this approach are (1) employment of eigen modes of a reference linear system, (2) incorporation of basis functions with an appropriate discontinuity at the location of the nonlinearity. Galerkin solution using the above combination of basis functions appears to capture the dynamics of the system with a small basis set. For problems involving small amplitude dynamics, the addition of discontinuous (joint) modes appears to capture the nonlinear mechanics correctly while preserving the modal form of the predictions. For problems involving large amplitude dynamics of realistic joint models (macro-slip), the use of appropriate joint modes along with sufficient basis eigen modes to capture the frequencies of the system greatly enhances convergence, though the modal nature the result is lost. Also observed is that when joint modes are used in conjunction with a small number of elastic eigen modes in problems of macro-slip of realistic joint models, the resulting predictions are very similar to those of the full solution when seen through a low pass filter. This has significance both in terms of greatly reducing the number of degrees of freedom of the problem and in terms of facilitating the use of much larger time steps.

NTIS

Nonlinearity; Mathematical Models

20070005159 University of Western Ontario, London, Ontario, Canada

Temporal Analysis of Social Networks Using Three-Way DEDICOM

Bader, B. W.; Harshman, R. A.; Kolda, T. G.; Jun. 2006; 30 pp.; In English

Report No.(s): DE2006-887253; SAND2006-2161; No Copyright; Avail.: National Technical Information Service (NTIS)

DEDICOM is an algebraic model for analyzing intrinsically asymmetric relationships, such as the balance of trade among nations or the flow of information among organizations or individuals. It provides information on latent components in the data that can be regarded as properties or aspects of the objects, and it finds a few patterns that can be combined to describe many relationships among these components. When we apply this technique to adjacency matrices arising from directed graphs, we obtain a smaller graph that gives an idealized description of its patterns. Three-way DEDICOM is a higher-order extension of the model that has certain uniqueness properties. It allows for a third mode of the data, such as time, and permits the analysis of semantic graphs. We present an improved algorithm for computing three-way DEDICOM on sparse data and demonstrate it by applying it to the adjacency tensor of a semantic graph with time-labeled edges. Our application uses the Enron email corpus, from which we construct a semantic graph corresponding to email exchanges among Enron personnel over a series of 44 months. Meaningful patterns are recovered in which the representation of asymmetries adds insight into the social networks at Enron.

NTIS

Algorithms; Asymmetry; Mathematical Models; Semantics

60
COMPUTER OPERATIONS AND HARDWARE

Includes hardware for computer graphics, firmware and data processing. For components see *33 Electronics and Electrical Engineering*. For computer vision see *63 Cybernetics, Artificial Intelligence and Robotics*.

20070003534 Iskra Sistemi d.d., Ljubljana, Slovenia

Development of multi service provisioning platform in synchronous digital hierarchy systems

Vaupotic, Marko; Muscet, Marinko; Zemva, Andrej; Electrotechnical Review, Volume 73, No.4; 2006, pp. 189-194; In Slovene; See also 20070003533; Copyright; Avail.: Other Sources

This paper describes a development project whose goal was to design a new multi-service provisioning platform for SDH systems with integrated proprietary microwave line interfaces. The next-generation network elements are a fairly new bread of network elements based on the standard SDH equipment such as add-drop multiplexers, terminal multiplexers, and digital cross-connectors. Over the years, the expansion of packet-based data have made the producers add data-aware interfaces, such as Ethernet, SAN, DVB-SI and others, to the legacy equipment. A new type of products has been born. Protocols that enable an easy and efficient integration of packet-based systems in the predominant TDM transport networks are Generic Framing Procedure (GFP), Virtual Concatenation (VCAT) and Link Capacity Adjustment Scheme (LCAS). The main part of the paper presents development of the MSSP and provides a further insight into the hardware subsystems of the central module, which in fact builds the main functionality of the whole system. Because of the cost and available resources related issues, we chose PM5337, an application specific integrated circuit, for the core of our MSPP system. The paper also describes the implemented software with an emphasis on open-source programs like embedded Linux for the operating system and Net SNMP for management architecture. For the time being, SNMP is the most widely deployed and used protocol for network management. It allowed for integration of our products in a large network management system of HP OpenView type. For the graphical user interface, we made use of the Java powerful features with which we were able to deploy the element management systems on a number of different host computers. Another feature implemented in the system, which is currently getting acceptance by other network element manufacturers, is the use of the IP protocol in data communication channels within SDH regeneration and multiplexer sections.

Author

Computers; Data Systems; Digital Systems; Multiplexing; Protocol (Computers); Computer Techniques

20070003890 University of Southern California, Marina del Rey, CA USA

Real-Time High-Dynamic Range Texture Mapping

Jan 2001; 10 pp.; In English

Report No.(s): AD-A459538; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Dynamic Range; Real Time Operation; Binary Digits; Memory (Computers); Computer Aided Mapping

20070005273 North Carolina State Univ., Raleigh, NC USA

Curve and Polygon Evolution Techniques for Image Processing

Bozkurt, Gozde; Jan 2002; 156 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459881; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459881; Avail.: CASI: A08, Hardcopy

No abstract available

Image Processing; Polygons

20070005288 State Univ. of New York, Binghamton, NY USA

Using Heterogeneous High Performance Computing Cluster for Supporting Fine-Grained Parallel Applications

Abu-Gazaleh, Nael; Oct 2006; 23 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8750-05-1-0130; Proj-NBGQ

Report No.(s): AD-A459900; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459900; Avail.: CASI: A03, Hardcopy

The use of a heterogeneous cluster comprised of host processors and Field Programmable Gate Arrays (FPGAs) was investigated for accelerating the performance of parallel fine-grained applications using a direct FPGA to FPGA communication channel. The communication channel is implemented with an all-to-all board that attaches directly to the

FPGA boards via their I/O interface. Test scripts were written to test the all-to-all board. The necessary communication support was designed, tested, and implemented to allow message exchange over the all-to-all board. The all-to-all support provides a low latency, low-bandwidth, communication channel for the FPGAs that can considerably extend the range of parallel applications. The Parallel Discrete Event Simulation was used to demonstrate that this computing model can accelerate the performance of parallel applications.
DTIC
Field-Programmable Gate Arrays; Heterogeneity; Parallel Processing (Computers)

20070005387 Defence Science and Technology Organisation, Victoria, Australia
Coloured Petri Net Modelling of a Generic Avionics Mission Computer
Dodd, R B; Apr 2006; 94 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460072; DSTO-TN-0692; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A Coloured Petri Net has been developed to model real-time task scheduling in avionics mission computers. The model has been applied to a generic avionics mission computer specification, and results are presented for a range of task scheduling protocols. Model input data, output data and complete design are documented to support application of the model to other mission computer hardware and software architectures.
DTIC
Airborne/Spaceborne Computers; Architecture (Computers); Avionics; Color; Petri Nets

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.

20070003501 University of Southern California, Marina del Rey, CA USA
Modeling Dynamic Perceptual Attention in Complex Virtual Environments
Kim, Youngjun; van Velsen, Martin; Hill, Jr, Randall W; Jan 2005; 13 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459223; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459223; Avail.: CASI: A03, Hardcopy

An important characteristic of a virtual human is the ability to direct its perceptual attention to entities and areas in a virtual environment in a manner that appears believable and serves a functional purpose. In this paper, we describe a perceptual attention model that integrates perceptual attention that mediates top-down and bottom-up attention processes of virtual humans within complex virtual environments.
DTIC
Cognition; Virtual Reality

20070003505 University of Southern California, Marina del Rey, CA USA
Simulation Meets Hollywood: Integrating Graphics, Sound, Story and Character for Immersive Simulation
Swartout, W; Gratch, J; Hill, R; Hovy, E; Lindheim, R; Marsella, S; Rickel, J; Traum, D; Jan 2005; 26 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAAD-19-99-D-0046
Report No.(s): AD-A459196; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459196; Avail.: CASI: A03, Hardcopy

The Institute for Creative Technologies was created at the University of Southern California with the goal of bringing together researchers in simulation technology to collaborate with people from the entertainment industry. The idea was that much more compelling simulations could be developed if researchers who understood state-of-the-art simulation technology worked together with writers and directors who knew how to create compelling stories and characters. This paper presents our first major effort to realize that vision, the Mission Rehearsal Exercise Project, which confronts a soldier trainee with the kinds of dilemmas he might reasonably encounter in a peacekeeping operation. The trainee is immersed in a synthetic world and interacts with virtual humans: artificially intelligent and graphically embodied conversational agents that understand and generate natural language, reason about world events and respond appropriately to the trainee's actions or commands. This project is an ambitious exercise in integration, both in the sense of integrating technology with entertainment industry content, but also in that we have also joined a number of component technologies that have not been integrated before. This integration has not only raised new research issues, but it has also suggested some new approaches to difficult problems. In this paper we describe the Mission Rehearsal Exercise system and the insights gained through this large-scale integration.

DTIC

Simulation; Virtual Reality

20070003507 University of Southern California, Marina del Rey, CA USA

Towards Integrating AI Story Controllers and Game Engines: Reconciling World State Representations

Riedl, Mark O; Jan 2006; 7 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459217; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459217; Avail.: CASI: A02, Hardcopy

Recently, many AI researchers working on interactive storytelling systems have turned to off-the-shelf game engines for simulation and visualization of virtual 3D graphical worlds. Integrating AI research into game engines can be difficult due to the fact that game engines typically do not use symbolic or declarative representations of characters, settings, or actions. This is particularly true for interactive storytelling applications that use an AI story controller to subtly manipulate a virtual world in order to bring about a structured narrative experience for the user. In this paper, I describe a general technique for translating between an arbitrary game engine's proprietary and procedural world state representation into a declarative form that can be used by an AI story controller. The work is placed in the context of building a narrative- based training simulation.

DTIC

Artificial Intelligence; Controllers; Game Theory

20070003508 University of Southern California, Marina del Rey, CA USA

Development of a Data Management Tool for Investigating Multivariate Space and Free Will Experiences in Virtual Reality

Morie, Jacquelyn F; Iyer, Kumar; Luigi, Donat-Pierre; Williams, Josh; Dozois, Aimee; Rizzo, Albert; Jan 2006; 10 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459216; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459216; Avail.: CASI: A02, Hardcopy

Virtual Reality (VR) has become mature enough to be successfully used in clinical applications such as exposure therapy, pain distraction and neuropsychological assessment. However, we now need to go beyond the outcome data from this research and conduct the detailed scientific investigations required to better understand what factors influence why VR works (or doesn't) in these types of clinical applications. This knowledge is required to guide the development of VR applications in the key areas of education, training and rehabilitation and to further evolve existing VR approaches. One of the primary assets obtained with the use of VR is the ability to simulate the complexity of real world environments, within which human performance can be tested and trained. But this asset comes with a price in terms of the capture, quantification and analysis of large, multivariate and concurrent data sources that reflect the naturalistic behavioral interaction that is afforded in a virtual world. As well, while achieving realism has been a main goal in making convincing VR environments, just what constitutes realism and how much is needed is still an open question situated firmly in the research domain. Just as in real reality , such factors in virtual reality are complex and multivariate, and the understanding of this complexity presents exceptional challenges to the VR researcher. For certain research questions, good behavioral science often requires consistent delivery of stimuli within tightly controlled lab-based experimental conditions. However, for other important research questions we do not want to constrain naturalistic behavior and limit VR's ability to replicate real world conditions, simply because it is easier to study human performance with traditional lab-based methodologies. By doing so we may compromise the very qualities that comprise VR's unique capacity to mimic the experiences and challenges that exist in everyday life.

DTIC

Data Management; Multivariate Statistical Analysis; Software Development Tools; Virtual Reality

20070003510 Carnegie-Mellon Univ., Pittsburgh, PA USA

The Case for an Open Data Model

Myers, Brad A; Aug 1998; 28 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N66001-94-C-6037; ARPA ORDER-B326

Report No.(s): AD-A459454; CMU-CS-98-153; CMU-HCII-98-101; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459454; Avail.: CASI: A03, Hardcopy

The trend in modern software systems such as Java is to support 'reflection,' wherein independent software can query to

find out the properties of objects. The authors have been investigating the implications of taking this property even further, so that all aspects of an application are open and available to inspection by external software. By giving the fundamental data structures of the application a standard format, external components can access the information they need without requiring a complex protocol. The authors have found that this gives the application developer and end users many important benefits, including support for increased automation, extensive end-user customization capabilities, external agents and tutors, sophisticated search and replace, scripting and macros, alternative interfaces without re-implementing the application, plug-ins that operate in the same space, and significantly higher re-use of common code. Many of these benefits are demonstrated in their Amulet user interface development environment, which uses the open data model.
DTIC
Application Programming Interface; Computer Programming; Data Management; Graphical User Interface; Object-Oriented Programming; Software Engineering

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20070003513 University of Southern California, Marina del Rey, CA USA
Scalable Solutions for Interactive Virtual Humans that can Manipulate Objects
Kallmann, Marcelo; Jan 2005; 7 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459163; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459163; Avail.: CASI: A02, Hardcopy

This paper presents scalable solutions for achieving virtual humans who are able to manipulate objects in interactive virtual environments. The scalability trades computational time with the ability to address increasingly difficult constraints. In time-critical environments, arm motions are computed in a few milliseconds using fast analytical Inverse Kinematics. For other types of applications in which collision-free motions are required, a randomized motion planner capable of generating motions of average complexity in approximately a second of computation time is employed. The steps required for defining and computing different types of manipulations are described in this paper.
DTIC
Collision Avoidance; Computer Animation; Computer Graphics; Computerized Simulation; Kinematics; Motion; Virtual Reality

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20070003515 University of Southern California, Marina del Rey, CA USA
Human Emotional State and its Relevance for Military VR Training
Rizzo, Albert; Morie, Jacquelyn F; Williams, Josh; Pair, Jarrell; Buckwalter, J G; Jul 2005; 11 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459161; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459161; Avail.: CASI: A03, Hardcopy

Combat environments by their nature can produce a dramatic range of emotional responses in military personnel. When immersed in the emotional ‘fog of war’, the potential exists for optimal human decision-making and performance of goal-directed activities to be seriously compromised. Real world military training often naturally includes stress induction that aims to promote a similarity of internal emotional stimulus cues with what is expected to be present on the battlefield. Current Virtual Reality military training approaches are noteworthy in their emphasis on creating hi-fidelity graphic and audio realism with the aim to foster better transfer of training. However, less emphasis is typically placed on the creation of emotionally evocative virtual training scenarios that can induce emotional stress in a manner similar to what is typically experienced under real world training conditions. As well, emotional issues in the post-combat aftermath need to be addressed. In view of these issues, the USC Institute for Creative Technologies (ICT) has initiated a research program to study emotional issues that are relevant to VR military applications. This paper will present the rationale and status of two ongoing VR research programs at the ICT that address sharply contrasting ends of the emotional spectrum relevant to the military: 1. The Sensory Environments Evaluation (SEE) Project is examining basic factors that underlie emotion as it occurs within VR training environments and how this could impact transfer of training, and 2. The Full Spectrum Warrior (FSW) Post Traumatic Stress Disorder Project which is currently in the process of converting the existing FSW combat tactical simulation training scenario (and X-Box game) into a VR treatment system for the conduct of graduated exposure therapy in Iraq war military personnel with Post Traumatic Stress Disorder.
DTIC
Combat; Education; Emotional Factors; Emotions; Exposure; Simulation; Therapy; Virtual Reality

20070003523 University of Southern California, Marina del Rey, CA USA

The Fidelity of 'Feel': Emotional Affordance in Virtual Environments

Morie, Jacquelyn F; Williams, Josh; Dozois, Aimee; Luigi, Donat-Pierre; Jul 2005; 11 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459193; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459193; Avail.: CASI: A03, Hardcopy

Virtual environments (VEs) should be able to provide experiences as rich and complex as those to be had in real life. While this seems obvious, it is not yet possible to create a perfect simulacrum of the real world, so such correspondence requires the development of design techniques by which VEs can be made to appear more real. It also requires evaluation studies to determine if such techniques produce the desired results. As emotions are implicated in our phenomenological understanding of the physical world, they should also play an integral role in the experience of the virtual one. Therefore, a logical sequence of experimentation to understand how VEs can be made to function as emotion-induction systems is in order. The Sensory Environments Evaluation (SEE) research program has developed a twofold design process to explore if we react to virtually supplied stimuli as we do to the real world equivalents. We look at manipulating both the sensory and emotional aspects of not only the environment but also the participant. We do this with the focus on what emotional affordances this manipulation will provide. Our first evaluation scenario, DarkCon, was designed in this way to produce a strong sense of presence. Sixty-four subjects have been fielded to date and the data is currently being analyzed for results. We hope to find that rich design techniques along with the frame of mind with which a VR experience is approached will predictably influence perception and behavior within a virtual world. We will use these results to inform continuing research into the creation of more emotionally affective VEs.

DTIC

Emotional Factors; Emotions; Virtual Reality

20070003524 University of Southern California, Marina del Rey, CA USA

Mixing Story and Simulation in Interactive Narrative

Riedl, Mark O; Stern, Andrew; Dini, Don; Jan 2006; 3 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459181; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459181; Avail.: CASI: A01, Hardcopy

Simulation is a common feature in computer entertainment. However, in computer games, simulation and story are often kept distinct by interleaving periods of interactive play and cut scenes -- short noninteractive scenes that transition from one mission to the next, providing the player with goals and motivation for the next segment of game play. In this mode of alternating between game play and cut scenes, story elements and simulation are kept strictly separate. The authors describe a technique for an 'Interactive Narrative' system that more closely integrates simulation and storyline. 'Interactive Narrative' is an approach to interactive entertainment that enables the player to make decisions that directly affect the direction and/or outcome of the narrative experience being delivered by the computer system. The technique uses a combination of semi-autonomous character agents and high-level story direction. The storyline is decomposed into directives to character agents to achieve particular world states. Otherwise, character agents are allowed to behave autonomously. When the player's actions create inconsistency between the simulation state and storyline, the storyline is dynamically adapted and repaired to resolve any inconsistencies.

DTIC

Adaptation; Computer Graphics; Computerized Simulation; Games; Simulation; Virtual Reality

20070003525 University of Southern California, Marina del Rey, CA USA

Building Robust Planning and Execution Systems for Virtual Worlds

Dini, Don M; van Lent, Michael; Carpenter, Paul; Iyer, Kumar; Jan 2006; 8 pp.; In English

Report No.(s): AD-A459180; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459180; Avail.: CASI: A02, Hardcopy

Planning and execution systems have been used in a wide variety of systems to create practical and successful automation. They have been used for everything from performing scientific research on the surface of Mars to controlling enemy characters in video games to performing military air campaign planning. After reviewing past work on these various planning and execution systems, we believe that most lack one or more key components contained in another system. To enable future researchers to build more complete systems, and avoid possible serious system failure, we identify the major technical problems any implementer of such a system would have to face. In addition we cite recent solutions to each of these technical

problems. We limit our focus to planning and execution for virtual worlds and the unique problems faced therein.
DTIC
Artificial Intelligence; Virtual Reality

20070003526 University of Southern California, Marina del Rey, CA USA
Nonverbal Behavior Generator for Embodied Conversational Agents
Lee, Jina; Marsella, Stacey; Jan 2006; 14 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459134; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459134; Avail.: CASI: A03, Hardcopy

Believable nonverbal behaviors for embodied conversational agents (ECA) can create a more immersive experience for users and improve the effectiveness of communication. This paper describes a nonverbal behavior generator that analyzes the syntactic and semantic structure of the surface text as well as the affective state of the ECA and annotates the surface text with appropriate nonverbal behaviors. A number of video clips of people conversing were analyzed to extract the nonverbal behavior generation rules. The system works in real time and is user extensible so that users can easily modify or extend the current behavior generation rules.
DTIC
Extraction; Real Time Operation; Semantics; Syntax; Texts

20070003560 NASA Langley Research Center, Hampton, VA, USA, National Inst. of Aerospace, Hampton, VA, USA
A High-Level Formalization of Floating-Point Number in PVS
Boldo, Sylvie; Munoz, Cesar; October 2006; 23 pp.; In English; Original contains black and white illustrations
Contract(s)/Grant(s): NCC1-02043; WBS 23-065-10-22; NIA-Proj. 2204
Report No.(s): NASA/CR-2006-214298; NIA-Rept-2006-01; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003560; Avail.: CASI: A03, Hardcopy

We develop a formalization of floating-point numbers in PVS based on a well-known formalization in Coq. We first describe the definitions of all the needed notions, e.g., floating-point number, format, rounding modes, etc.; then, we present an application to polynomial evaluation for elementary function evaluation. The application already existed in Coq, but our formalization shows a clear improvement in the quality of the result due to the automation provided by PVS. We finally integrate our formalization into a PVS hardware-level formalization of the IEEE-854 standard previously developed at NASA.
Author
Floating Point Arithmetic; Formalism; Numerical Analysis; Real Numbers

20070003561 Massachusetts Inst. of Tech., Cambridge, MA USA
Modeling Stock Order Flows and Learning Market-Making from Data
Jun 2002; 9 pp.; In English
Contract(s)/Grant(s): N00014-00-1-0907; N00014-00-1-O637
Report No.(s): AD-A459806; AI-MEMO-2002-009; CBCL-MEMO-217; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available
Models; Data Processing; Market Research

20070003632 SRI International Corp., Menlo Park, CA USA
Introduction to SPARK. Version 0.3
Jul 13, 2004; 24 pp.; In English
Contract(s)/Grant(s): NBCHD-03-0010
Report No.(s): AD-A459669; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Artificial Intelligence; Language Programming

20070003633 Stanford Research Inst., CA USA
QLISP: A Language for the Interactive Development of Complex Systems
Mar 1976; 27 pp.; In English
Contract(s)/Grant(s): DAHC04-75-C-0005; DAAG29-76-C-0012
Report No.(s): AD-A459668; SRI-TN-120; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Complex Systems; Language Programming; Artificial Intelligence

20070003670 Hughes Training, Inc. Mesa, AZ USA

Distributive Interactive Simulation Network Interface for A-10 Simulator in Support of I/ITSEC '95 Conference Demonstrations

Jul 1996; 11 pp.; In English

Contract(s)/Grant(s): F41624-95-C-5011; Proj-1123

Report No.(s): AD-A459708; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Computerized Simulation; Conferences; Simulators; Computer Graphics

20070003672 Massachusetts Inst. of Tech., Cambridge, MA USA

Face Recognition with Support Vector Machines: Global versus Component-Based Approach

Jan 2001; 8 pp.; In English

Contract(s)/Grant(s): N00014-93-1-3085; N00014-00-1-0907

Report No.(s): AD-A459707; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Vector Processing (Computers); Machine Learning; Pattern Recognition

20070003702 University of Southern California, Marina del Rey, CA USA

Toward a New Generation of Virtual Humans for Interactive Experiences

Rickel, Jeff; Marsella, Stacy; Gratch, Jonathan; Hill, Randall; Traum, David; Swartout, William; Jan 2002; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-95-C-0179; N00014-97-1-0598

Report No.(s): AD-A459229; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459229; Avail.: CASI: A02, Hardcopy

Interactive virtual worlds provide a powerful medium for entertainment and experiential learning. Army lieutenants can gain valuable experience in decision-making in scenarios like the example above. Others can use the same technology for entertaining role-playing even if they never have to face such situations in real life. Similarly, students can learn about, say, ancient Greece by walking through its virtual streets, visiting its buildings, and interacting with its people. Scientists and science fiction fans alike can experience life in a colony on Mars long before the required infrastructure is in place. The range of worlds that people can explore and experience with virtual-world technology is unlimited, ranging from factual to fantasy and set in the past, present, or future. Our goal is to enrich such worlds with virtual humans autonomous agents that support face-to-face interaction with people in these environments in a variety of roles, such as the sergeant, medic, or even distraught mother. Existing virtual worlds, such as military simulations and computer games, often incorporate virtual humans with varying degrees of intelligence. However, these characters ability to interact with human users is usually very limited: Typically, users can shoot at them and they can shoot back. Those characters that support more collegial interactions, such as in children's educational software, are usually very scripted and offer human users no ability to carry on a dialogue. In contrast, we envision virtual humans that cohabit virtual worlds with people and support face-to-face dialogues situated in those worlds, serving as guides, mentors, and teammates. Although our goals are ambitious, we argue here that many key building blocks are already in place.

DTIC

Virtual Reality; Human Body

20070003703 University of Southern California, Marina del Rey, CA USA

Creating Interactive Virtual Humans: Some Assembly Required

Gratch, Jonathan; Rickel, Jeff; Andre, Elisabeth; Cassell, Justine; Petajan, Eric; Badler, Norman; Aug 2002; 11 pp.; In English

Contract(s)/Grant(s): DAAD19-99-D-0046; F33615-99-D-6001-0008

Report No.(s): AD-A459228; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459228; Avail.: CASI: A03, Hardcopy

Science fiction has long imagined a future populated with artificial humans- human-looking devices with human-like intelligence. Although Asimov's benevolent robots and the Terminator movies' terrible war machines are still a distant fantasy, researchers across a wide range of disciplines are beginning to work together toward a more modest goal building virtual humans. These software entities look and act like people and can engage in conversation and collaborative tasks, but they live in simulated environments. With the untidy problems of sensing and acting in the physical world thus dispensed, the focus

of virtual human research is on capturing the richness and dynamics of human behavior. This broad range of requirements poses a serious problem. Researchers working on particular aspects of virtual humans cannot explore their component in the context of a complete virtual human unless they can understand results across this array of disciplines and assemble the vast range of software tools (for example, speech recognizers, planners, and animation systems) required to construct one. Moreover, these tools were rarely designed to interoperate and, worse, were often designed with different purposes in mind. For example, most computer graphics research has focused on high fidelity offline image rendering that does not support the fine-grained interactive control that a virtual human must have over its body. In the spring of 2002, about 30 international researchers from across disciplines convened at the University of Southern California to begin to bridge this gap in knowledge and tools. Our ultimate goal is a modular architecture and interface standards that will allow researchers in this area to reuse each other's work. This goal can only be achieved through a close multidisciplinary collaboration. Towards this end, the workshop gathered a collection of experts representing the range of required research areas. Here we discuss some of the key issues.
DTIC
Virtual Reality; Human Body

20070003712 Colorado Univ., Boulder, CO USA
The DINO Parallel Programming Language
Apr 1990; 45 pp.; In English
Contract(s)/Grant(s): AFOSR-85-0251; DCR-8420944
Report No.(s): AD-A459435; CU-CS-457-90; No Copyright; Avail.: CASI: A03, Hardcopy
No abstract available
Parallel Programming; Language Programming; Artificial Intelligence

20070003860 Pennsylvania Univ., Philadelphia, PA USA
Identifying Semantic Roles Using Combinatory Categorial Grammar
Jan 2003; 9 pp.; In English
Contract(s)/Grant(s): MDA904-00-C-2136; NSF-ITR-0205-456
Report No.(s): AD-A459462; No Copyright; Avail.: CASI: A02, Hardcopy
No abstract available
Grammars; Semantics; Identifying

20070004724 Washington Univ., Seattle, WA USA
MCLUST: Software for Model-Based Clustering, Density Estimation and Discriminant Analysis
Oct 1, 2002; 51 pp.; In English
Contract(s)/Grant(s): N00014-96-1-0192; N00014-96-1-0330
Report No.(s): AD-A459792; TR-415; No Copyright; Avail.: CASI: A04, Hardcopy
No abstract available
Discriminant Analysis (Statistics); Cluster Analysis; Estimating; Computer Programs; Density

20070004767 Army Research Lab., Aberdeen Proving Ground, MD USA
Evaluating Co-Array Fortran and Unified Parallel C
Nov 2006; 26 pp.; In English
Contract(s)/Grant(s): Proj-6UH7CL
Report No.(s): AD-A459771; ARL-MR-654; No Copyright; Avail.: CASI: A03, Hardcopy
No abstract available
FORTRAN; Programming Languages; C++ (Programming Language); Parallel Programming

20070004829 Thinking Machines Corp., Cambridge, MA USA
An Optimal Parallel Implementation of a Quadratic Transportation Algorithm
Mar 7, 1990; 9 pp.; In English
Contract(s)/Grant(s): AFOSR-89-0145
Report No.(s): AD-A459551; No Copyright; Avail.: CASI: A02, Hardcopy
No abstract available
Algorithms; Transportation; Parallel Computers; Quadratic Programming; Optimization

20070004833 University of Southern California, Marina del Rey, CA USA
NL Generation for Virtual Humans in a Complex Social Environment
Jan 2003; 9 pp.; In English
Contract(s)/Grant(s): DAAD19-99-D-0046
Report No.(s): AD-A459528; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Sociology; Virtual Reality; Human Beings; Environments; Natural Language (Computers)

20070004836 Texas Univ. at Dallas, Richardson, TX USA
Computational Limitations of Model Based Recognition
Feb 1991; 15 pp.; In English
Contract(s)/Grant(s): DAAL03-86-K-0171; F19628-90-C-0002
Report No.(s): AD-A459522; LIDS-P-2020; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Image Processing; Pattern Recognition; Models; Computational Geometry

20070004870 Mitre Corp., Bedford, MA USA
A Business Case Study of Open Source Software
Jul 2001; 89 pp.; In English
Contract(s)/Grant(s): DAAB07-01-C-C201
Report No.(s): AD-A459563; MP-01B0000048; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Commerce; Open Source Licensing (Computers); Computer Programs

20070004873 Massachusetts Inst. of Tech., Cambridge, MA USA
A Class of Adaptive Control Problems Solved via Stochastic Control
Aug 1988; 13 pp.; In English
Contract(s)/Grant(s): AFOSR-85-0227B
Report No.(s): AD-A459561; LIDS-P-1765; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Adaptive Control; Stochastic Processes

20070005194 Mitre Corp., Bedford, MA USA
State of the Art in Anomaly Detection and Reaction: An Update
LaPadula, Leonard J; Feb 24, 2000; 21 pp.; In English
Contract(s)/Grant(s): F19628-99-C-0001
Report No.(s): AD-A459587; MP-99B0000020SUPP1; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459587; Avail.: CASI: A03, Hardcopy

This paper is a supplement to the author's May 1999 report, 'State of the Art in Anomaly Detection and Reaction,' (MP-99B000020). Although this supplement claims there are no major trends discernible since publication of the report, it should nevertheless have utility for anyone interested in the state of the art in anomaly detection and reaction as it is described in the 1999 report. There have been some noteworthy developments in the past year or so, including new commercial tools being released and new government research initiatives. The author first considers who the market leaders are and takes a look at mergers, acquisitions, and product transfers. He revisits commercial offerings and government research and development efforts. Based on these short reviews and other information gathered over the past year, he considers technical trends. This supplement is organized as follows: (1) Commercial Products: -- a look at the marketplace and a summary of commercial products based on an updated ADR Compendium; (2) Research and Development -- identification of some new initiatives; and (3) Technical Trends -- discussion of trends and commentary on what the state of affairs augurs for military sponsors. The appendix is a summary of COTS ADR products in table form that includes name of tool, type, release date, and vendor.
DTIC

Anomalies; Commercial Off-the-Shelf Products; Computer Networks; Responses; Warfare

20070005211 Stottler Henke Associates, Inc., San Mateo, CA USA

Using Computer Games to Train Information Warfare Teams

Cramer, Michael J; Ramachandran, Sowmya; Viera, Janelle K; Jan 2004; 11 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459676; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459676; Avail.: CASI: A03, Hardcopy

Information warfare and security are crucial to maintaining homeland security. An important mission of the information warfare force is to ensure that secure information and facilities are well protected. One way to ensure this is to try to gain access to this information as outsiders and see how well the practices and policies designed to protect data are being enforced. Teams of Information Warfare personnel (a.k.a. the Red Teams) are dedicated to the mission of testing the security of information and assets crucial to American interests. Most such missions necessitate deception in order to test the extent to which data is protected from strangers and parties who are not trusted. High-levels of stress are inevitable, and the Red Teams need to be highly skilled in thinking creatively under such stress. Given the criticality and the degree of danger of these missions, they have to be carefully trained. For computer-based approaches, providing realistic simulations is essential for successful training. Engaging the trainee emotionally to elicit the types of stress responses they will experience on real missions is crucial. 3D computer games have proved themselves to be highly effective in engaging players motivationally and emotionally. This effort, therefore, uses gaming technology to provide realistic simulations. These games are augmented with Artificial Intelligence techniques for enabling trainees to interact with the simulation using natural language, intelligent evaluation of the student's performance, and automated after-action review that allows the trainees to assess their own performance and provide justifications for their actions. This paper describes the details of this approach, providing examples of the simulations and after-action reviews, and discusses its benefits and limitations.

DTIC

Computerized Simulation; Education; Games; Security; Warfare

20070005266 Carnegie-Mellon Univ., Pittsburgh, PA USA

Analytical Design of Evolvable Software for High-Assurance Computing

Hoover, Carol L; Feb 14, 2001; 351 pp.; In English

Contract(s)/Grant(s): F30602-96-2-0240

Report No.(s): AD-A459872; CMU-CS-01-111; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459872; Avail.: CASI: A16, Hardcopy

Software is a ubiquitous feature of today's world. The goodness of products and services is frequently dependent on the goodness of the related software. Optimal software performs correctly and requires minimal effort and cost to develop and maintain. The development of optimal software is an admirable goal but is difficult to achieve. In particular, software maintenance and evolution is costly and error-prone. The significance of the problem is magnified for high-assurance applications that require the certainty that the software will behave reliably despite budget constraints and product evolution. Though automated software development is the ideal solution, design for evolution is the practical solution. For most applications, analysis of the required behavior (behavioral analysis) and translation into a blueprint for building the software (software design) are necessary. High-level design involves the organization of the required behavior into building blocks or components. Design for evolution is the generation of a software architecture that can be changed with minimal human effort to produce a class of similar applications. Design for evolution makes feasible the cost effective development of high-assurance applications. This dissertation presents a semi-automatable research approach for designing an evolvable software architecture. The research approach focuses on the partition of basic elements of a software solution into reusable components that localize the effects of change. The input to the partitioning process is a set of software requirements along with an analysis of the required behavior and planned or feasible evolution of the product line. The output is a partition of the required behavior into components that reduce the effort associated with developing a software product line. The dissertation provides an analytical verification of the research approach through proof and constructive examples.

DTIC

Architecture (Computers); Computer Programming; Software Engineering

20070005274 Mississippi State Univ., Starkville, MS USA

User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2

Haupt, Tomasz A; Henley, Greg; Sura, Bhargavi; Kirkland, Robert; Floyd, Jason; Scheffey, Joseph; Tatem, Patricia A; Williams, Frederick W; Dec 18, 2006; 68 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00173-03-C-2005; N00173-05-C-2009

Report No.(s): AD-A459882; NRL/MR/6180--06-9013; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459882; Avail.: CASI: A04, Hardcopy

The collaborative work of Hughes Associates, Inc., the Naval Research Laboratory, and a group at Mississippi State University resulted in development of a simulation system including a Graphical User Interface (GUI) for setting up Fire and Smoke Simulations and for visualization of results. The simulation environment provides a runtime for a third-party Fire and Smoke SIMulator (FSSIM). The user's manual provides documentation of the GUI and detailed discussion of features of the output display.

DTIC

Computerized Simulation; Fires; Graphical User Interface; Manuals; Simulation; Smoke; User Manuals (Computer Programs)

20070005276 Georgia Tech Research Inst., Atlanta, GA USA

Standardization of Object Oriented Extensions to Vector Signal and Image Processing Library (VSIPL)

Campbell, Daniel P; Oct 2006; 17 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8750-05-1-0217; Proj-HPEC

Report No.(s): AD-A459884; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459884; Avail.: CASI: A03, Hardcopy

The Vector Signal and Image Processing Library (VSIPL) is an industry standard Application Programming interface for embedded signal processing tasks. The High Performance Embedded Computing Software Initiative (HPEC-SI) program is a collaborative program to establish extensions to the VSIPL specification to support Object Oriented elements of the C + + programming language, and encapsulated support for data parallel processing. The program goals include the simultaneous threefold improvement in software portability, threefold improvement in developer productivity, and fifty per cent improvement in software performance compared to standard practices.

DTIC

Computer Programs; Image Processing; Libraries; Object-Oriented Programming; Signal Processing; Standardization; Vector Processing (Computers)

20070005308 Molecular Sciences Inst., Berkeley, CA USA

Methods, Knowledge Support, and Experimental Tools for Modeling

Brent, Roger; Lok, Larry; Oct 2006; 20 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F30602-01-2-0565; Proj-BIOC

Report No.(s): AD-A459947; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459947; Avail.: CASI: A03, Hardcopy

Our goal was to provide software and experimental abilities to support quantitative modeling of eukaryotic systems and thus to help enable new kinds of molecular logic. The most significant accomplishments were the development of two programs. One was a collaborative annotation, MONOD. MONOD embodied a number of genuinely novel ideas, particularly in the data structure, which constituted a middle ground between the highly structured relations of objects in a relational database and the unstructured representation of human text-based discourse and notes. The second, Moleculizer, addressed an important problem in simulating chemical reaction networks, the proliferation of closely related species of molecular complexes. This rule-based approach has since been widely adopted. Since the project period, the two programs have had different fates. Despite the notional advantages of MONOD, for the main purpose of knowledge support, we and others have opted for the free form text embodiment in a wiki (at www.openwetware.org). By contrast, work on Moleculizer continues at MSI with money from the Japanese E-cell project, and we have worked with a number of groups to port the basic concepts to other simulation software.

DTIC

Knowledge Based Systems; Simulation

20070005351 Colorado Univ., Boulder, CO USA

NoPumpG: Creating Interactive Graphics With Spreadsheet Machinery

Lewis, Clayton; Aug 1987; 42 pp.; In English

Contract(s)/Grant(s): CCR-9357740; N00014-96-1-0720

Report No.(s): AD-A460027; CU-CS-372-87; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460027; Avail.: CASI: A03, Hardcopy

The spreadsheet has made computing power widely accessible to nonprogrammers. By adding a small number of new concepts to the basic spreadsheet framework NoPumpG makes it possible to create interactive graphics, including animation, of the sort seen in physics and geometry tutorial demonstrations, without programming. While not as powerful as some other systems of this kind, NoPumpG appears to offer a favorable balance between power and conceptual simplicity.
DTIC
Computer Graphics; Spreadsheets

20070005352 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Reverse Logistics: Has the Implementation of Reverse Logistics Met the Objectives of Air Mobility Command
DeVore, Jeffrey W; May 2004; 95 pp.; In English
Report No.(s): AD-A460029; AFIT/GMO/ENS/04E-03; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460029; Avail.: CASI: A05, Hardcopy

The concept of reverse logistics is an important part of any supply chain in which the military participates. Air Mobility Command (AMC) plays an integral role in this process by providing transportation assets for support. This research paper represents an in-depth look at the AMC reverse logistics process to see if its implementation is meeting its intended objectives. Specifically, it focuses on what the goals and objectives of AMC's reverse logistics program are, and in what situations they fell short of their intentions. It also addresses improvement areas by applying two civilian models to the program. The researched areas revealed the AMC reverse logistics process has not met its objectives for several reasons. Internally, funding and software issues have halted the program. Externally, the non-inclusion of other armed services into the initial strategy has not given the program the correct environment in which it is supposed to function. The whole idea of the Strategic Distribution Management Initiative and the transformation movement of the logistics world is to operate under one standardized and common supply chain which will allow joint logistics movement in both peace and war. AMC's program, while supporting certain Air Force assets, has not expanded its scope to incorporate the entire DoD. The AMC reverse logistics program has limited written guidance and AMC is facing issues right now which are hindering its progress. By reviewing and analyzing the data, weaknesses of the program have been identified for future process refinement.
DTIC
Logistics; Logistics Management; Mobility

20070005355 Carnegie-Mellon Univ., Pittsburgh, PA USA
ORA: Organization Risk Analyzer
Carley, Kathleen M; Reminga, Jeff; Jul 2004; 50 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-07-1-0037; N00014-02-1-0973
Report No.(s): AD-A460034; CMU-ISRI-04-106; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460034; Avail.: CASI: A03, Hardcopy

ORA is a network analysis tool that detects risks or vulnerabilities of an organization's design structure. The design structure of an organization is the relationship among its personnel, knowledge, resource, and task entities. These entities and relationships are represented by the Meta-Matrix. Measures that take as input a Meta-Matrix are used to analyze the structural properties of an organization for potential risk. ORA contains over 50 measures which are categorized by which type of risk they detect. Measures are also organized by input requirements and by output. ORA generates formatted reports viewable on screen or in log files, and reads and writes networks in multiple data formats to be interoperable with existing network analysis packages. In addition, it has tools for graphically visualizing Meta-Matrix data and for optimizing a network's design structure. ORA uses a Java interface for ease of use, and a C++ computational backend. The current version ORA 1.2 software is available.
DTIC
C (Programming Language); Interoperability; Risk

20070005438 Cybernet Systems Corp., Ann Arbor, MI USA
Improving Human Interfaces in Military Simulation Applications
Rowe, Steve; Band, Joshua; Cohen, Charles; Haas, Michael; Sep 2006; 5 pp.; In English
Contract(s)/Grant(s): FA8650-05-M-6567; Proj-3005
Report No.(s): AD-A460144; No Copyright; Avail.: CASI: A01, Hardcopy

This paper highlights some of the key human factors issues that we found in OneSAF, and how we chose to remedy them in our own system design. The goal is to provide guidelines for application human interface design standards so that future

tools developed for the Department of Defense allow the operator to perform more effectively.
DTIC
Human-Computer Interface; Military Technology; Prototypes; Simulation

20070005444 Wright State Univ., Dayton, OH USA
Specification for Visual Requirements of Work-Centered Software Systems
Knapp, James R; Chung, Soon M; Schmidt, Vincent A; Sep 2006; 10 pp.; In English
Contract(s)/Grant(s): F33601-03-F-0065; Proj-2830
Report No.(s): AD-A460152; No Copyright; Avail.: CASI: A02, Hardcopy

Work-centered software systems function as inherent work-aiding systems. Based on the design concept for a work-centered support system (WCSS), these software systems support user tasks and goals through both direct and indirect aiding methods within the interface client. In order to ensure the coherent development and delivery of work-centered software products, WCSS visual requirements must be specified to capture the cognitive aspects of the user interface design. A work-centered specification language based on the User Interface Markup Language (UIML) is an effective solution to bridging this gap between cognitive systems engineering and software engineering. A visual requirements specification language can capture and describe work-centered visual requirements within a semi-formal syntax. The proposed language can also be easily integrated into a UML object model via the use of UML's extensibility features. A specification language for visual requirements could be employed by cognitive engineers and design teams to help convey requirements in a comprehensible format that is suitable for a software engineer. Such a solution provides coherency in the software modeling process of developing work-centered software systems.
DTIC
Requirements; Software Development Tools; Software Engineering; Specifications; Visual Perception

20070005449 Massachusetts Univ., Amherst, MA USA
LIFT - The LIsp Framework for Testing
King, Gary; Jan 2001; 15 pp.; In English
Contract(s)/Grant(s): F49620-97-1-0485; DASG60-99-C-0074
Report No.(s): AD-A460160; No Copyright; Avail.: CASI: A03, Hardcopy

A sometimes overlooked value of software testing is that it enables fearless programming and constant refactoring. Since the design is often the first causuality of sitting down to code, having a complete test suite improves productively and allows for rapid change and experimentation. This report describes LIFT: the LIsp Framework for Testing. LIFT supports the construction of a hierarchical suite of tests that can be run in batch (for regression testing) or interactively (which suits the style of Lisp). The philosophy, design and use of LIFT are discussed and LIFT is compared with several other Lisp testing frameworks.
DTIC
Batch Processing; Coding; Hierarchies; LISP (Programming Language)

20070005496 Army Research Inst., Alexandria, VA USA
Joint Synthetic Battlespace Desert Pivot Experiment (JDPE)
Kwak, S D; Andrew, Emily; Murtha, Jack; Brown, Don; Mar 2003; 10 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460325; No Copyright; Avail.: CASI: A02, Hardcopy

The goal of the Joint Synthetic Battlespace Experiment (JDPE) is to prove the underlying concept of the Joint Synthetic Battlespace (JSB) in the context of the warfighters, i.e., USAF operational users. The JSB has been conceptualized and prototyped to support the transforming USAF into a capability oriented standard, such as Global Strike Task Forces (GSTF), rather than the current weapon platform centric. The new capability can only be realized by synergistic integration of existing and new weapons/C2/ISR systems. JSB plans on being the very tool for CONOP development, R&D, acquisition, training, mission planning, rehearsal, and even disposal of component systems in the future USAF. Initially, JSB was focused on supporting new weapon/C2/ISR system conceptualization, development, and acquisition. The next application domain is USAF operational use. Air Combat Command's (ACC) Tactical Air Command and Control Simulation Facility (TACCSF) conducts a quarterly Desert Pivot (DP) exercise in conjunction with Red Flag of Nellis AFB. The first JSB Experiment, which is called JDPE Event 1, was conducted during DP 03-01 in October 2002. This paper discusses the JDPE architecture and the details of the JDPE Event 1.
DTIC
Computerized Simulation; Deserts; Education; Pivots

20070005497 Mitre Corp., Bedford, MA USA

Protocol Independence through Disjoint Encryption

Guttman, Joshua D; Thayer Fabrega, F J; Apr 10, 2000; 13 pp.; In English

Contract(s)/Grant(s): DAAB07-99-C-C201

Report No.(s): AD-A460326; No Copyright; Avail.: CASI: A03, Hardcopy

One protocol (called the primary protocol) is independent of other protocols (jointly called the secondary protocol) if the question whether the primary protocol achieves a security goal never depends on whether the secondary protocol is in use. In this paper, we use multiprotocol strand spaces to prove that two cryptographic protocols are independent if they use encryption in non-overlapping ways. This theorem (Proposition 7.2) applies even if the protocols share public key certificates and secret key tickets. We use the method of authentication tests to study penetrator paths, namely sequences of penetrator actions connecting regular nodes (message transmissions or receptions) in the two protocols. Of special interest are inbound linking paths, which lead from a message transmission in the secondary protocol to a message reception in the primary protocol. We show that bundles can be modified to remove all inbound linking paths, if encryption does not overlap in the two protocols. The resulting bundle does not depend on any activity of the secondary protocol. We illustrate this method using the Neuman-Stubblebine protocol as an example.

DTIC

Cryptography; Protocol (Computers)

20070005515 University of Southern California, Marina del Rey, CA USA

Emotionally Evocative Environments for Training

Morie, J F; Iyer, K; Valanejad, K; Sadek, R; Miraglia, D; Milam, D; Jan 2002; 7 pp.; In English

Contract(s)/Grant(s): DAAD19-99-D-0046

Report No.(s): AD-A460361; No Copyright; Avail.: CASI: A02, Hardcopy

This paper describes a project currently in progress at the University of Southern California's Institute for Creative Technologies (ICT). Much of the research at ICT involves developing better graphics, sound and artificial intelligence to be used in creating the next generation of training tools for the USA Army. Our project focuses on the use of emotional responses as an enhancement for training. Research indicates that an emotional connection is a strong factor in how and what we remember. In addition, real world situations often evoke surprising and significant emotional reactions that soldiers must deal with. Few current immersive training scenarios, however, focus on the emotional state of the trainee, limiting training scenarios to basic objective elements. The Sensory Environments Evaluation (SEE) Project at ICT is investigating the potential of emotionally compelling environments for more effective training. We do this by skillfully combining the sensory inputs available in virtual environments. Our current efforts concentrate on sight and sound; smell will be included as scent delivery methods improve. Evaluation studies are planned to determine the effectiveness of the techniques we are developing.+

DTIC

Computer Programming; Education; 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.

20070003542 Ljubljana Univ., Ljubljana, Slovenia

Self-calibration on a Three-sampler Network Analyzer with Nonstandard Connectors

Kostevc, Drago; Mlakar, Joze; Electrotechnical Review, Volume 73, No.4; 2006, pp. 179-182; In English; See also 20070003533; Copyright; Avail.: Other Sources

The authors show a simple method enabling a self-calibration technique with a three-sampler automatic vector network analyzer. The main purpose is to determine internal reflections of the analyzer with standard connectors by using any calibration method for the three-sampler analyzer. The rest of the error model of the analyzer with non-standard connectors, and thus the complete model, is determined by calibrating the analyzer using one of the self-calibration techniques.

Author

Calibrating; Connectors; Network Analysis; Computer Networks

20070003573 Ljubljana Univ., Ljubljana, Slovenia
Semantic Web Rule Languages
Lavbic, Dejan; Bajec, Marko; Krisper, Marjan; Electrotechnical Review, Volume 73, No. 5; 2006, pp. 249-254; In Slovene; See also 20070003567; Copyright; Avail.: Other Sources

Semantic Web rule languages play an important role in making Semantic Web valued and are gaining support. Rules can be used for describing declarative knowledge of ontology languages and to express restrictions or transformations that can include the portion of description logic. On the other hand rules can express policy enforcement, define responses to changes, specify intelligent agent behaviors and be used for other purposes. Therefore, Semantic Web rule languages will play an important role for being lingua franca in interchanging rules among different systems and tools, enabling developing, running, publishing and interacting among Semantic Web rules. It is important to emphasize that reuse and interchange of rules at a higher abstract layer is required due to the fact that during the knowledge acquisition process rules are captured at the business level. To enable rules to be used at the information system level, some translation is required to establish several abstraction layers. In the paper we present a framework for knowledge representation that uses ontologies and rules. Our main focus is on the dynamic, heterogeneous environment and use of the knowledge base where ontologies and rules are combined thus extending OWL DL expressiveness. The merging phase is supported by converters, because there are presently no reasoning engines available to support the latest SWRL proposal. This paper also presents several approaches to rule representation on the Semantic Web, from SWRL, ORL to RuleML.
Author
Information Systems; Knowledge Representation; Languages; Computer Networks; Protocol (Computers); Information Transfer

20070003634 Department of Defense, Washington, DC USA
Network Centric Warfare
Jul 27, 2001; 201 pp.; In English
Report No.(s): AD-A459663; No Copyright; Avail.: CASI: A10, Hardcopy

No abstract available
Electronic Warfare; Computer Networks

20070003692 California Univ., Santa Cruz, CA USA
Collision Avoidance and Resolution Multiple Access (CARMA)
Jan 1998; 31 pp.; In English
Contract(s)/Grant(s): DAAB07-95-C-D157; DAAH04-96-1-0210
Report No.(s): AD-A459699; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Collision Avoidance; Multiple Access; Software Engineering; Computer Programs; Network Control

20070003731 NASA Stennis Space Center, Stennis Space Center, MS, USA
Sensor Networking Testbed with IEEE 1451 Compatibility and Network Performance Monitoring
Gurkan, Deniz; Yuan, X.; Benhaddou, D.; Figueroa, F.; Morris, Jonathan; [2007]; 4 pp.; In English; Sensors Applications Symposium/IEEE, 6-8 Feb. 2007, San Diego, CA, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): NNS04AB67T; NNS06ZBA001C
Report No.(s): SSTI-2200-0078; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003731; Avail.: CASI: A01, Hardcopy

Design and implementation of a testbed for testing and verifying IEEE 1451-compatible sensor systems with network performance monitoring is of significant importance. The performance parameters measurement as well as decision support systems implementation will enhance the understanding of sensor systems with plug-and-play capabilities. The paper will present the design aspects for such a testbed environment under development at University of Houston in collaboration with NASA Stennis Space Center - SSST (Smart Sensor System Testbed).
Author
Compatibility; Sensors; Multisensor Fusion; Computer Networks; Network Analysis

20070003812 Mitre Corp., Bedford, MA USA

Security Guards for the Future Web

Sep 2004; 154 pp.; In English

Report No.(s): AD-A459589; MTR-04W0000092; No Copyright; Avail.: CASI: A08, Hardcopy

No abstract available

Security; Computer Security; World Wide Web

20070003825 Carnegie-Mellon Univ., Pittsburgh, PA USA

'Black-Box' Probabilistic Verification

Sep 2004; 18 pp.; In English

Contract(s)/Grant(s): DAAD19-01-1-0485

Report No.(s): AD-A458539; CMU-CS-04-162; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Probability Theory; Program Verification (Computers)

20070003830 Idaho Univ., Moscow, ID USA

Implementation-Oriented Secure Architectures

Conte de Leon, Daniel; Alves-Foss, Jim; Oman, Paul W; Jan 2006; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F30602-02-1-0178

Report No.(s): AD-A459080; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459080; Avail.: CASI: A03, Hardcopy

We propose a framework for constructing secure systems at the architectural level. This framework is composed of an implementation-oriented formalization of a system's architecture, which we call the formal implementation model, along with a method for the construction of a system based on elementary analysis, implementation, and synthesis steps. Using this framework, security vulnerabilities can be avoided by constraining the architecture of a system to those architectures that can be rigorously argued to implement all corresponding functional and security requirements, and no other. Furthermore, the framework enables the verification and validation of system correctness by enforcing traceability of final system components to their corresponding design, architecture, and requirement work products.

DTIC

Architecture (Computers); Computer Information Security

20070003857 Washington Univ., Seattle, WA USA

A Set-Covering Approach for Modeling Attacks on Key Predistribution in Wireless Sensor Networks

Tague, Patrick; Lee, Jooyoung; Poovendran, Radha; Jan 2005; 7 pp.; In English

Contract(s)/Grant(s): DAAD19-01-2-0011; N00014-04-1-0479

Report No.(s): AD-A459109; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459109; Avail.: CASI: A02, Hardcopy

We study attacks by adversaries which aim to compromise links in a wireless sensor network through various techniques which are modeled using the set-covering problem. We discuss the effects of the attacks and present techniques which can be used to mitigate the effects of the attacks. Furthermore, we analyze the performance of various key predistribution schemes with and without the mitigation techniques.

DTIC

Communication Networks; Wireless Communication; Models; Sensors

20070004723 Naval Postgraduate School, Monterey, CA USA

Joint Fire Support in 2020: Development of a Future Joint Fires Systems Architecture for Immediate, Unplanned Targets

Dec 2006; 277 pp.; In English

Report No.(s): AD-A459793; NPS-97-07-002; No Copyright; Avail.: CASI: A13, Hardcopy

No abstract available

Architecture (Computers); Fires; Targets

20070004826 Michigan Univ., Ann Arbor, MI USA
Smart Register Files for High-Performance Microprocessors
Jun 28, 1999; 52 pp.; In English
Contract(s)/Grant(s): DABT63-97-C-0047
Report No.(s): AD-A459519; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Microprocessors; Registers (Computers); Files; Computer Systems Programs

20070004828 Mitre Corp., Bedford, MA USA
Intrusion Detection System Requirements. A Capabilities Description in Terms of the Network Monitoring and Assessment Module of CSAP21
Sep 2000; 33 pp.; In English
Contract(s)/Grant(s): F19628-C-99-0001
Report No.(s): AD-A459552; MP-00B0000046; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Warning Systems; Intrusion Detection (Computers); Computer Networks; Requirements

20070004830 Mitre Corp., Bedford, MA USA
Intrusion Reaction: Recommendations for Obtaining Reaction Capabilities
Sep 1998; 38 pp.; In English
Contract(s)/Grant(s): F19628-94-C-0001
Report No.(s): AD-A459533; MTR-98B0000066; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Intrusion Detection (Computers); Computer Networks; Command and Control; Computer Information Security

20070004831 Massachusetts Inst. of Tech., Cambridge, MA USA
Scaling Results for the Variational Approach to Edge Detection
Jan 1991; 38 pp.; In English
Contract(s)/Grant(s): AFOSR-89-0279B; DAAL03-86-K-0171
Report No.(s): AD-A459531; LIDS-P-2016; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Edge Detection; Calculus of Variations

20070004926 Massachusetts Inst. of Tech., Cambridge, MA USA
State Feedback l(sub 1)-Optimal Controllers can be Dynamic
Aug 14, 1991; 12 pp.; In English
Contract(s)/Grant(s): F33615-90-C-3608
Report No.(s): AD-A459573; LIDS-P-2051; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Controllers; Dynamical Systems; Feedback Control; Optimal Control

20070005283 Idaho Univ., Moscow, ID USA
How to Prevent Type-Flaw Guessing Attacks on Password Protocols
Malladi, Sreekanth; Alves-Foss, Jim; Jan 2003; 12 pp.; In English
Contract(s)/Grant(s): F30602-2-1-0178
Report No.(s): AD-A459892; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459892; Avail.: CASI: A03, Hardcopy

A message in a protocol is said to have a type-flaw if it was created with an intended type, but is later received and treated as a different type. A type-flaw guessing attack is an attack in which a type-flaw is induced in a protocol to enable a password guessing attack to occur. Heather, Lowe, and Schneider in ‘How to Prevent Type Flaw Attacks on Security Protocols’ (July 2000) prove that attacks that use type-flaws can be prevented if honest agents tag messages with their intended types. However, their tagging scheme cannot be used in a password protocol since it allows a guess to be directly verified using the tags inside

password encryptions. In this paper, the authors prove that following a modification of Heather et al.'s scheme, most type-flaw guessing attacks can still be prevented.
DTIC
Access Control; Computer Information Security; Computer Networks; Cryptography; Defects; Marking; Numerical Control; Prevention; Protocol (Computers)

20070005325 Massachusetts Inst. of Tech., Cambridge, MA USA
Optimally Robust Redundancy Relations for Failure Detection in Uncertain Systems
Lou, Xi-Cheng; Willsky, Alan S; Verghese, George C; Mar 1985; 34 pp.; In English
Contract(s)/Grant(s): N00014-77-C-0224
Report No.(s): AD-A459971; MIT-LIDS-P-1447; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459971; Avail.: CASI: A03, Hardcopy

All failure detection methods are based, either explicitly or implicitly, on the use of redundancy, i.e. on (possibly dynamic) relations among the measured variables. The robustness of the failure detection process consequently depends to a great degree on the reliability of the redundancy relations, which in turn is affected by the inevitable presence of model uncertainties. In this paper, we address the problem of determining redundancy relations that are optimally robust, in a sense that includes several major issues of importance in practical failure detection, and that provides a significant amount of intuition concerning the geometry of robust failure detection. We also give a procedure, involving the construction of a single matrix and its singular value decomposition, for the determination of a complete sequence of redundancy relations, ordered in terms of their level of robustness. This procedure also provides the basis for comparing levels of robustness in redundancy provided by different sets of sensors.
DTIC
Detection; Failure; Redundancy; Uncertain Systems

20070005346 Carnegie-Mellon Univ., Pittsburgh, PA USA
CORES - Complex Organizational Reasoning System
Kowalchuck, Michael; Singh, Siddhartha; Carley, Kathleen M; Sep 2004; 64 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAAH01-03-C-R169
Report No.(s): AD-A460017; CMU-ISRI-04-131; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460017; Avail.: CASI: A04, Hardcopy

In Operations Other Than War (OOTW), there is a need for intelligence analysts and military planners to anticipate the actions and responses of complex networked organizations such as terrorist groups, nation-states and key actors (such a high-level leaders). The Complex Organizational Reasoning System (CORES) is a multi-agent network simulation model that uses organizational, social, political and economic dynamics to generate predictions of the likely actions and responses of these actors when involved in an adversarial context.
DTIC
Complex Systems; Cores

20070005365 California Univ., Santa Cruz, CA USA
Floor Acquisition Multiple Access with Collision Resolution
Garces, Rodrigo; Garcia-Luna-Aceves, J J; Jan 1996; 12 pp.; In English
Contract(s)/Grant(s): DAAB07-95-C-D157
Report No.(s): AD-A459700; No Copyright; Avail.: CASI: A03, Hardcopy

Collision avoidance and resolution multiple access (CARMA) protocols are presented and analyzed. These protocols use a floor acquisition multiple access (FAMA) strategy based on carrier sensing, together with collision resolution of floor requests (RTS) based on a tree-splitting algorithm. For analytical purposes, an upper bound is derived for the average costs of resolving collisions of floor requests using the tree-splitting algorithm. This bound is then applied to the computation of the average channel utilization in a fully connected network with a large number of stations. Under light-load conditions, CARMA protocols achieve the same average throughput as FAMA protocols. It also is shown that, as the arrival rate of RTSs increases, the throughput achieved by CARMA protocols is close to the maximum throughput that any FAMA protocol can achieve if propagation delays and the control packets used to acquire the floor are much smaller than the data packet trains sent by stations. Simulation results validate the simplifying approximations made in the analytical mode. The authors' analysis

results indicate that collision resolution makes floor acquisition multiple access much more effective.
DTIC
Collision Avoidance; Collisions; Computer Networks; Floors; Multiple Access; Packet Switching; Protocol (Computers); Wireless Communication

20070005366 California Univ., Santa Cruz, CA USA

A Near-Optimum Channel Access Protocol Based on Incremental Collision Resolution and Distributed Transmission Queues

Garces, Rodrigo; Garcia-Luna-Aceves, J J; Jan 1998; 9 pp.; In English
Contract(s)/Grant(s): DAAB07-95-C-D157; DAAH04-96-1-0210
Report No.(s): AD-A459701; No Copyright; Avail.: CASI: A02, Hardcopy

The authors introduce a new stable multiple access protocol for broadcast channels shared by multiple stations, which they call the incremental collision resolution multiple access (ICRMA) protocol. ICRMA dynamically divides the channel into cycles of variable length; each cycle consists of a contention period and a queue-transmission period. The queue-transmission period is a variable-length train of packets that are transmitted by stations that have been added to the distributed transmission queue by successfully completing a collision-resolution round in a previous contention period. During the contention period, stations with one or more packets to send compete for the right to be added to the data-transmission queue using a deterministic tree-splitting algorithm. A single round of collision resolution is allowed in each contention period. Analytical results show that collision resolution in ICRMA is much more efficient than DQRAP's. Simulation and analytical results show that ICRMA's throughput is within 5% of the throughput achieved by the ideal channel access protocol based on a distributed transmission queue and incremental collision resolution.
DTIC
Broadcasting; Collision Avoidance; Collisions; Local Area Networks; Multiple Access; Packet Switching; Protocol (Computers); Wireless Communication

20070005421 North Carolina State Univ., Raleigh, NC USA

Scalable Authorization in Role-Based Access Control Using Negative Permissions and Remote Authorization

Shah, Arpan P; Jan 2003; 79 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-00-C-0068
Report No.(s): AD-A460113; No Copyright; Avail.: CASI: A05, Hardcopy

Administration of access control is a major issue in large-scale computer systems. Many such computer systems proposed over recent years aim at reducing the effort required to govern access. Role-based access control (RBAC) systems are a huge benefit to this point. They reduce the tasks of an administrator or authorities when users take on different roles in an organization and need to be assigned different access rights or privileges based on these roles. RBAC is a very expressive and flexible access control mechanism that makes it possible to have security policies based on the principle of least privilege, static and dynamic separation of duties, conflicts between roles and permissions, and many more. This research proposes the use of negative permissions and remote authorization for improving the scalability of an RBAC implementation.
DTIC
Access Control; Numerical Control

20070005501 Mitre Corp., Bedford, MA USA

Exploring Speech-Enabled Dialogue with the Galaxy Communicator Infrastructure

Bayer, Samuel; Doran, Christine; George, Bryan; Jan 2001; 4 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAAB07-99-C201
Report No.(s): AD-A460333; No Copyright; Avail.: CASI: A01, Hardcopy

This demonstration will motivate some of the significant properties of the Galaxy Communicator Software Infrastructure and show how they support the goals of the DARPA Communicator program.
DTIC
Galaxies; Interprocessor Communication; Speech

20070005521 Carnegie-Mellon Univ., Pittsburgh, PA USA

Defense in Depth: Foundation for Secure and Resilient IT Enterprises

May, Christopher J; Hammerstein, Josh; Mattson, Jeff; Rush, Kristopher; Sep 2006; 366 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8721-05-C-0003

Report No.(s): AD-A460375; CMU/SEI-2006-HB-003; No Copyright; Avail.: CASI: A16, Hardcopy

The Defense-in-Depth Foundational Curriculum is designed for students, ranging from system administrators to CIOs, who have some technical understanding of information systems and want to delve into how technical assurance issues affect their entire organizations. The course material takes a big-picture view while also reinforcing concepts presented with some details about implementation. Therefore, this course can be a useful pursuit for system administrators and IT security personnel who would like to step up to the management level. It also can provide a refresher for IT managers and executives who want to stay up to date on the latest technological threats facing their enterprises. The curriculum consists of eight main modules: (1) Compliance Management, (2) Risk Management, (3) Identity Management, (4) Authorization Management, (5) Accountability Management, (6) Availability Management, (7) Configuration Management, and (8) Incident Management. The document also contains an introduction, 'Foundations of Information Assurance,' which focuses on how the overarching concepts of confidentiality, integrity, and availability can lead to a comprehensive security strategy.

DTIC

Depth; Information Systems; Security

20070005523 Product Data Integration Technology, Long Beach, CA USA

ARN II Program, Final Technical Report

O'Connell, Michael H; Dec 8, 2006; 157 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): SP0103-02-D-0016-0003

Report No.(s): AD-A460386; No Copyright; Avail.: CASI: A08, Hardcopy

The DLA and DSCP sponsored Apparel Research Network (ARN) program's primary goals are to reduce total supply chain costs and inventory levels while minimizing retail shortages. The foundation for the achievement of these goals is the existence of a web accessible database that provides total supply chain asset visibility to all functions that make decisions or consume apparel items. PDIT's ARN assignments were to create the web accessible database, create decision support tools that utilize this database, and develop tools for use by apparel manufacturers and bill-and-hold contractors that capture the data needed to fill voids in the total supply chain asset visibility picture. PDIT initiated three key projects to address these assignments. The ARN Asset Visibility System database (AAVS DataMart) was developed to create the central repository for total supply chain asset visibility. VIM (Virtual Item Manager) was created to provide visibility and decision support tools. VIM-ASAP (ARN Supply-chain Automated Processing) was developed to support apparel manufacturers and bill-and-hold contractors while capturing order and shipment status data needed to make more informed decisions.

DTIC

Clothing; Computer Storage Devices; Data Storage; Inventory Controls

63

CYBERNETICS, ARTIFICIAL INTELLIGENCE AND ROBOTICS

Includes feedback and control theory, information theory, machine learning, and expert systems. For related information see also *54 Man/System Technology and Life Support.*

20070003502 University of Southern California, Marina del Rey, CA USA

Virtual Rapport

Gratch, Jonathan; Okhmatovskaia, Anna; Lamothe, Francois; Marsella, Stacy; Morales, Mathieu; Werf, R J van der; Morency, Louis-Philippe; Jan 2006; 15 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459210; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459210; Avail.: CASI: A03, Hardcopy

Effective face-to-face conversations are highly interactive. Participants respond to each other, engaging in nonconscious behavioral mimicry and backchanneling feedback. Such behaviors produce a subjective sense of rapport and are correlated with effective communication, greater liking and trust, and greater influence between participants. Creating rapport requires a tight sense-act loop that has been traditionally lacking in embodied conversational agents. Here we describe a system, based on psycholinguistic theory, designed to create a sense of rapport between a human speaker and virtual human listener. We

provide empirical evidence that it increases speaker fluency and engagement.
DTIC
Human-Computer Interface; Psycholinguistics

20070003504 University of Southern California, Marina del Rey, CA USA
Commonsense Psychology and the Functional Requirements of Cognitive Models
Gordon, Andrew S; Jul 2005; 8 pp.; In English
Report No.(s): AD-A459197; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459197; Avail.: CASI: A02, Hardcopy

In this paper we argue that previous models of cognitive abilities (e.g. memory, analogy) have been constructed to satisfy functional requirements of implicit commonsense psychological theories held by researchers and nonresearchers alike. Rather than working to avoid the influence of commonsense psychology in cognitive modeling research, we propose to capitalize on progress in developing formal theories of commonsense psychology to explicitly define the functional requirements of cognitive models. We present a taxonomy of 16 classes of cognitive models that correspond to the representational areas that have been addressed in large-scale inferential theories of commonsense psychology. We consider the functional requirements that can be derived from inferential theories for one of these classes, the processes involved in human memory. We argue that the breadth coverage of commonsense theories can be used to better evaluate the explanatory scope of cognitive models, as well as facilitate the investigation of larger-scale cognitive systems.
DTIC
Functional Design Specifications; Psychology

20070003506 University of Southern California, Marina del Rey, CA USA
Dealing with Out of Domain Questions in Virtual Characters
Patel, Ronakkumar; Leuski, Anton; Traum, David; Jan 2006; 13 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459219; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459219; Avail.: Defense Technical Information Center (DTIC)

We consider the problem of designing virtual characters that support speech-based interactions in a limited domain. Previously we have shown that classification can be an effective and robust tool for selecting appropriate in-domain responses. In this paper, we consider the problem of dealing with out-of-domain user questions. We introduce a taxonomy of out-of-domain response types. We consider three classification architectures for selecting the most appropriate out-of-domain responses. We evaluate these architectures and show that they significantly improve the quality of the response selection making the user’s interaction with the virtual character more natural and engaging.
DTIC
Artificial Intelligence; Symbols

20070003509 University of Southern California, Marina del Rey, CA USA
Automated Commonsense Reasoning About Human Memory
Swanson, Reid; Gordon, Andrew S; Jan 2005; 7 pp.; In English
Report No.(s): AD-A459177; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459177; Avail.: CASI: A02, Hardcopy

Metacognitive reasoning in computational systems will be enabled by the development of formal theories that have broad coverage over mental states and processes as well as inferential competency. In this paper we evaluate the inferential competency of an existing formal theory of commonsense human memory by attempting to use it to validate the appropriateness of a commonsense memory strategy. We formulate a particular memory strategy (to create an associated obstacle) as a theorem in first-order predicate calculus. We then attempt to validate this strategy by showing that it is entailed by the axioms of the theory we evaluated. These axioms were encoded into the syntax of an automated reasoning system, which was used to automatically generate inferences and search for formal proofs.
DTIC
Memory

20070003516 New York Univ., New York, NY USA
A Unified Construction of the Glushkov, Follow, and Antimirov Automata
Allauzen, Cyril; Mohri, Mehryar; Jan 2006; 17 pp.; In English
Contract(s)/Grant(s): W23RYX-3275-N605

Report No.(s): AD-A459063; NYU-TR-2006-880; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459063; Avail.: CASI: A03, Hardcopy

Many techniques have been introduced in the last few decades to create epsilon-free automata representing regular expressions: Glushkov automata, the so-called follow automata, and Antimirov automata. This paper presents a simple and unified view of all these epsilon-free automata both in the case of unweighted and weighted regular expressions. It describes simple and general algorithms with running time complexities at least as good as that of the best previously known techniques, and provides concise proofs. The construction methods are all based on two standard automata algorithms: epsilon-removal and minimization. This contrasts with the multitude of complicated and special-purpose techniques and proofs put forward by others to construct these automata. Our analysis provides a better understanding of epsilon-free automata representing regular expressions: they are all the results of the application of some combinations of epsilon-removal and minimization to the classical Thompson automata. This makes it straightforward to generalize these algorithms to the weighted case, which also results in much simpler algorithms than existing ones. For weighted regular expressions over a closed semiring, we extend the notion of follow automata to the weighted case. We also present the first algorithm to compute the Antimirov automata in the weighted case.

DTIC

Automata Theory; Construction

20070003521 University of Southern California, Marina del Rey, CA USA

Reflective Tutoring for Immersive Simulation

Lane, H C; Core, Mark; Gomboc, Dave; Solomon, Steve; van Lent, Michael; Rosenberg, Milton; Jan 2006; 4 pp.; In English

Report No.(s): AD-A459150; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459150; Avail.: CASI: A01, Hardcopy

Reflection is critically important for time-constrained training simulations that do not permit extensive tutor-student interactions during an exercise. Here, we describe a reflective tutoring system for a virtual human simulation of negotiation. The tutor helps students review their exercise, elicits where and how they could have done better, and uses explainable artificial intelligence (XAI) to allow students the chance to ask questions about the virtual human's behavior.

DTIC

Artificial Intelligence; Computer Assisted Instruction; Simulation

20070003522 University of Southern California, Marina del Rey, CA USA

Explainable Artificial Intelligence for Training and Tutoring

Lane, H C; Core, Mark G; van Lent, Michael; Solomon, Steve; Gomboc, Dave; Jan 2005; 4 pp.; In English

Report No.(s): AD-A459148; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459148; Avail.: CASI: A01, Hardcopy

This paper describes an Explainable Artificial Intelligence (XAI) tool that allows entities to answer questions about their activities within a tactical simulation. We show how XAI can be used to provide more meaningful after-action reviews and discuss ongoing work to integrate an intelligent tutor into the XAI framework.

DTIC

Artificial Intelligence; Computer Assisted Instruction; Education

20070003531 SimSurgery, Oslo, Norway

Development of a Portable Simulator for Training Robot Assisted Surgery

Dec 2006; 11 pp.; In English

Contract(s)/Grant(s): W81XWH-06-1-0161

Report No.(s): AD-A459724; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Robots; Surgery; Training Simulators

20070003547 Massachusetts Inst. of Tech., Cambridge, MA USA

Speech Synthesis by Rule: An Acoustic Domain Approach

Jun 1967; 215 pp.; In English

Report No.(s): AD-A459694; No Copyright; Avail.: CASI: A10, Hardcopy

No abstract available

Speech; Computer Techniques

20070003635 SRI International Corp., Menlo Park, CA USA
Monitored Execution of Robot Plans Produced by Strips
Apr 1971; 7 pp.; In English
Contract(s)/Grant(s): NASW-2164
Report No.(s): AD-A459662; SRI-TR-55; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Robots; Artificial Intelligence; Computer Programs

20070003637 SRI International Corp., Menlo Park, CA USA
A Mobile Automaton: An Application of Artificial Intelligence Techniques
Jan 1969; 31 pp.; In English
Report No.(s): AD-A459660; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Artificial Intelligence; Automation

20070003694 Minnesota Univ., Minneapolis, MN USA
Differential Invariant Signatures and Flows in Computer Vision: A Symmetry Group Approach
Dec 10, 1993; 46 pp.; In English
Contract(s)/Grant(s): DMS-9204192; DMS-8811084
Report No.(s): AD-A459617; LIDS-P-2219; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Signatures; Symmetry; Computer Vision

20070003704 Army Tank-Automotive Research and Development Command, Warren, MI USA
Robotic Follower Experimentation Results
Jaczkowski, Jeffrey J; Jan 2003; 8 pp.; In English
Report No.(s): AD-A459224; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459224; Avail.: CASI: A02, Hardcopy

Robotics is a fundamental enabling technology required to meet the U.S. Army's vision to be a strategically responsive force capable of domination across the entire spectrum of conflict. The U. S. Army Research, Development and Engineering Command (RDECOM) Tank Automotive Research, Development & Engineering Center (TARDEC), in partnership with the U.S. Army Research Laboratory, is developing a leader-follower capability for Future Combat Systems. The Robotic Follower Advanced Technology Demonstration (ATD) utilizes a manned leader to provide a high-level proofing of the follower's path, which operates with minimal user intervention. This paper will give a programmatic overview and discuss both the technical approach and operational experimentation results obtained during testing conducted at Ft. Bliss, New Mexico in February-March 2003.

DTIC

Robotics; Technology Utilization; Research and Development; Defense Program

20070003705 University of Southern California, Marina del Rey, CA USA
Cognitive and Emotive Empathy in Discourse: Towards an Integrated Theory of Mind
Martinovsky, Bilyana; CogSci 2006; Jan 2006, pp. 1783-1788; In English; Annual Conference of the Cognitive Science Society (28th), CogSci 2006,, 26-29 Jul. 2006, Vancouver, Canada
Report No.(s): AD-A459214; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459214; Avail.: CASI: A02, Hardcopy

This paper presents an empirical qualitative analysis of eliciting, giving and receiving empathy in discourse. The study identifies discursive and linguistic features, which realize cognitive, emotive, parallel and reactive empathy and suggests that imitation, simulation and representation could be non-exclusive processes in Theory of Mind reasoning.

DTIC

Psycholinguistics; Brain

20070003728 University of Southern California, Marina del Rey, CA USA

Evaluating Social Causality and Responsibility Models: An Initial Report

Mao, Wenji; Gratch, Jonathan; Jan 2005; 16 pp.; In English

Report No.(s): AD-A459213; ICT-TR-03-2005; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459213; Avail.: CASI: A03, Hardcopy

Intelligent virtual agents are typically embedded in a social environment and must reason about social cause and effect. Social causal reasoning is qualitatively different from physical causal reasoning that underlies most current intelligent systems. Besides physical causality, the assessments of social cause emphasize epistemic variables including intentions, foreknowledge and perceived coercion. Modeling the process and inferences of social causality can enrich believability and cognitive capabilities of social intelligent agents. In this report, we present a general computational model of social causality and responsibility, and empirical results of a preliminary evaluation of the model in comparison with several other approaches.

DTIC

Social Factors; Embedding; Enrichment

20070003814 Massachusetts Inst. of Tech., Cambridge, MA USA

A Biological Model of Object Recognition with Feature Learning

May 21, 2003; 69 pp.; In English

Contract(s)/Grant(s): N00014-00-1-0907; N00014-02-1-0915

Report No.(s): AD-A459618; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available

Pattern Recognition; Feature Identification and Location Exper; Education; Bionics

20070003822 SRI International Corp., Menlo Park, CA USA

IDA: An Intelligent Data Access Program

Jun 1977; 40 pp.; In English

Contract(s)/Grant(s): DAAG29-76-C-0012

Report No.(s): AD-A458709; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Artificial Intelligence; Computer Programs; Data Processing

20070003834 Idaho Univ., Moscow, ID USA

Crawler Control Strategies and Their Influence on Mine Finding Capabilities

Welling, Douglas M; Edwards, Dean B; Jan 2005; 5 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-03-1-0634; N00014-03-1-0848

Report No.(s): AD-A459055; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459055; Avail.: CASI: A01, Hardcopy

Autonomous underwater vehicles (AUVs) have found a permanent application doing mine countermeasures (MCM). Autonomous crawlers can be used to perform mine search patterns, but in doing so can encounter many problems, one of which is obstacles. For a crawler, knowing how to avoid obstacles and what to do after avoiding obstacles is important to performing searches quickly and effectively. A fuzzy logic controller was developed to perform a comparison between point to point control and trajectory control with mine finding capability being the basis for comparison. A random walk control method was also simulated to show how it compared to the other methods. Search times were found to be similar, but the trajectory control was found to be more reliable at finding a larger percentage of mines. The trajectory control was optimized to more closely follow the trajectory and a comparison was performed between the baseline and optimized trajectory controls. After optimization, the crawler was able to stay on a straight line path for a larger percentage of the search time. This resulted in better mine finding performance than the preoptimization trajectory control.

DTIC

Underwater Vehicles; Controllers; Mine Detectors

20070003841 SRI International Corp., Menlo Park, CA USA

A Formal Theory of Knowledge and Action

Moore, Robert C; Feb 1984; 88 pp.; In English

Contract(s)/Grant(s): F49620-82-K-0031

Report No.(s): AD-A458917; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA458917; Avail.: CASI: A05, Hardcopy

Most work on planning and problem solving within the field of artificial intelligence assumes that the agent has complete knowledge of all relevant aspects of the problem domain and problem situation In the real world, however, planning and acting must frequently be performed without complete knowledge. This imposes two additional burdens on an intelligent agent trying to act effectively. First, when the agent entertains a plan for achieving some goal, he must consider not only whether the physical prerequisites of the plan have been satisfied, but also whether he has all the information necessary to carry out the plan. Second, he must be able to reason about what be can do to obtain necessary information that he lacks. In this paper, we present a theory of action in which these problems are taken into account, showing how to formalize both the knowledge prerequisites of action and the effects of action on knowledge.
DTIC
Artificial Intelligence; Formalism

20070004712 Army Tank-Automotive Research and Development Command, Warren, MI USA
Robotic Technologies for the Future Force - The ART STO
Apr 11, 2005; 8 pp.; In English
Report No.(s): AD-A459733; 2005-01-0839; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available
Robotics; Technology Utilization

20070004717 Army Tank-Automotive and Armaments Command, Warren, MI USA
Rudimentary Force Feedback for Safe Guarded Teleoperation of Unmanned Vehicles: A Simulations and Training Approach
Mar 21, 2006; 15 pp.; In English
Report No.(s): AD-A459765; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Unmanned Ground Vehicles; Teleoperators; Feedback; Simulation; Education

20070004778 Georgia Inst. of Tech., Atlanta, GA USA
Geometric Variational Methods for Controlled Active Vision
Tannenbaum, Allen; Aug 2006; 25 pp.; In English
Contract(s)/Grant(s): DAAD19-02-1-0378
Report No.(s): AD-A459371; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459371; Avail.: CASI: A03, Hardcopy

The key objective of this project is the use of visual information in a feedback loop, the underlying problem of controlled active vision. The problem of controlled active vision, and in particular visual tracking requires the integration of techniques from control theory, signal processing, and computer vision. For some time now the role of control theory in vision has been recognized. In particular, the branches of control that deal with system uncertainty, namely adaptive and robust, have been proposed as essential tools in coming to grips with the problems of both machine and biological vision. Visual tracking provides a fundamental example of the need for controlled active vision. While tracking in the presence of a disturbance is a classical control problem, visual tracking raises new issues. First since cameras are part of the system, one must consider the nature of the disturbance from imaging sensors. The feedback signal may require some interpretation of the image, for example segmentation of a target from its background, or an inference about an occluder. In the project, we expressly emphasize active vision, because the result may be viewpoint dependent. In particular, calibration may influence the control law. And finally, as visual processing becomes more complex, the issue of processing time arises. Each of these problems must be answered before target detection, and visually-mediated control can be provided for advanced weapon systems.
DTIC
Computer Vision; Feedback; Loops; Control Theory

20070004795 University of Southern California, Marina del Rey, CA USA
Building Explainable Artificial Intelligence Systems
Core, Mark G; Lane, H C; van Lent, Michael; Gomboc, Dave; Solomon, Steve; Rosenberg, Milton; Jan 2006; 9 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459166; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459166; Avail.: CASI: A02, Hardcopy

As artificial intelligence (AI) systems and behavior models in military simulations become increasingly complex, it has been difficult for users to understand the activities of computer-controlled entities. Prototype explanation systems have been added to simulators, but designers have not heeded the lessons learned from work in explaining expert system behavior. These new explanation systems are not modular and not portable; they are tied to a particular AI system. In this paper, we present a modular and generic architecture for explaining the behavior of simulated entities. We describe its application to the Virtual Humans, a simulation designed to teach soft skills such as negotiation and cultural awareness.
DTIC
Artificial Intelligence; Expert Systems; Numerical Control; Graphical User Interface

20070004824 University of Southern California, Los Angeles, CA USA
Toward a Multi-Robot Coordination Formalism
Jan 2004; 12 pp.; In English
Contract(s)/Grant(s): F30602-00-2-0573
Report No.(s): AD-A459516; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Coordination; Formalism; Robots

20070004919 Baker (Wilfred) Engineering, Inc., San Antonio, TX USA
A Detailed Look at Scale and Translation Invariance in a Hierarchical Neural Model of Visual Object Recognition
Aug 2002; 15 pp.; In English
Contract(s)/Grant(s): N00014-00-1-0907; IIS-0085836
Report No.(s): AD-A459489; AL MEMO 2002-011; CBCL MEMO 218; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Invariance; Pattern Recognition; Translating; Neural Nets; Mathematical Models

20070004920 University of Southern California, Los Angeles, CA USA
Adaptive Division of Labor in Large-Scale Minimalist Multi-Robot Systems
Jan 2003; 7 pp.; In English
Contract(s)/Grant(s): F30602-00-2-0573; EIA-0121141
Report No.(s): AD-A459488; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available
Labor; Robots; Robotics

20070004921 Baker (Wilfred) Engineering, Inc., San Antonio, TX USA
Investigating Shape Representation in Area V4 with HMAX: Orientation and Grating Selectivities
Sep 2003; 16 pp.; In English
Contract(s)/Grant(s): N00014-00-1-0907; IIS-0085836
Report No.(s): AD-A459487; AL MEMO 2003-021; CBCL MEMO 231; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Shapes; Visual Fields; Gratings (Spectra); Mathematical Models; Representations

20070005050 NASA Goddard Space Flight Center, Greenbelt, MD, USA
A Model-Driven Architecture Approach for Modeling, Specifying and Deploying Policies in Autonomous and Autonomic Systems
Pena, Joaquin; Hinchey, Michael G.; Sterritt, Roy; Ruiz-Cortes, Antonio; Resinas, Manuel; [2006]; 9 pp.; In English; 2nd IEEE International Conference on Dependable, Autonomic and Secure Comuting (DASC 2006), 29 Sept. - 1 Oct. 2006, Indianapolis, IN, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy

Autonomic Computing (AC), self-management based on high level guidance from humans, is increasingly gaining momentum as the way forward in designing reliable systems that hide complexity and conquer IT management costs. Effectively, AC may be viewed as Policy-Based Self-Management. The Model Driven Architecture (MDA) approach focuses on building models that can be transformed into code in an automatic manner. In this paper, we look at ways to implement Policy-Based Self-Management by means of models that can be converted to code using transformations that follow the MDA philosophy. We propose a set of UML-based models to specify autonomic and autonomous features along with the necessary

procedures, based on modification and composition of models, to deploy a policy as an executing system.
Author
Autonomy; Models; Architecture (Computers); Policies; Systems Engineering

20070005216 Massachusetts Inst. of Tech., Cambridge, MA USA
Biologically Plausible Neural Model for the Recognition of Biological Motion and Actions
Giese, Martin A; Poggio, Tomaso; Aug 2002; 27 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-00-1-0907; IIS-0085836
Report No.(s): AD-A459682; AI-MEMO-2002-012; CBCL-MEMO-219; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459682; Avail.: CASI: A03, Hardcopy

The visual recognition of complex movements and actions is crucial for communications and survival in many species. Remarkable sensitivity and robustness of biological motion perception have been demonstrated in psychophysical experiments. In recent years, neurons and cortical areas involved in action recognition have been identified in neurophysiological and imaging studies. However, the detailed neural mechanisms that underlie the recognition of such complex movement patterns remain largely unknown. This paper reviews the experimental results and summarizes them in terms of a biologically plausible neural model. The model is based on the key assumption that action recognition is based on learned prototypical patterns and exploits information from the ventral and dorsal pathway. The model makes specific predictions that motivate new experiments.
DTIC
Computer Vision; Models; Motion

20070005232 Army Tank-Automotive Research and Development Command, Warren, MI USA
Robotic Follower Experimentation Results
Jaczkowski, Jeffrey J; Jun 12, 2003; 8 pp.; In English
Report No.(s): AD-A459814; TARDEC-13868; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459814; Avail.: CASI: A02, Hardcopy

Robotics is a fundamental enabling technology required to meet the U.S. Army's vision to be a strategically responsive force capable of domination across the entire spectrum of conflict. The U.S. Army Research, Development and Engineering Command (RDECOM) Tank Automotive Research, Development and Engineering Center (TARDEC), in partnership with the U.S. Army Research Laboratory, is developing a leader-follower capability for Future Combat Systems. The Robotic Follower Advanced Technology Demonstration (ATD) utilizes a manned leader to provide a high-level proofing of the follower's path, which operates with minimal user intervention. This paper will give a programmatic overview and discuss both the technical approach and operational experimentation results obtained during testing conducted at Ft. Bliss, New Mexico in February-March 2003.
DTIC
Combat; Robotics; Weapon Systems

20070005303 Massachusetts Univ., Amherst, MA USA
Designing a Self-Stabilizing Robot for Dynamic Mobile Manipulation
Deegan, Patrick; Thibodeau, Bryan J; Grupen, Roderic; Jan 2006; 7 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-05-1-0396; NNJ05HB61A-5710001842
Report No.(s): AD-A459932; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459932; Avail.: CASI: A02, Hardcopy

The UMASS uBot-4 is a two wheeled, dynamically stable, bimanual mobile manipulator. It is a compact, safe, and cost effective platform with many features such as whole body postural control, force sensing actuators, two 4-DOF arms, and a small footprint. It is the latest in a series of small mobile robots that originated with the uBot-0.5 (ca. 1997). This paper presents the motivations for the design of the uBot series and describes how the platform evolved from a small reactive heat-seeking robot to a highly capable mobile manipulator.
DTIC
Degrees of Freedom; Robots; Stabilization

20070005306 BBN Systems and Technologies Corp., Cambridge, MA USA

Byblos Speech Recognition Benchmark Results

Kubala, F; Austin, S; Barry, C; Makhoul, J; Placeway, P; Schwartz, R; Jan 1991; 7 pp.; In English

Contract(s)/Grant(s): N00014-89-C-0008

Report No.(s): AD-A459943; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459943; Avail.: CASI: A02, Hardcopy

This paper presents speech recognition test results from the BBN BYBLOS system on the Feb 91 DARPA benchmarks in both the Resource Management (RM) and the Air Travel Information System (ATIS) domains. In the RM test, we report on speaker-independent (SI) recognition performance for the standard training condition using 109 speakers and for our recently proposed SI model made from only 12 training speakers. Surprisingly, the 12-speaker model performs as well as the one made from 109 speakers. Also within the RM domain, we demonstrate that state-of-the-art SI models perform poorly for speakers with strong dialects. But we show that this degradation can be overcome by using speaker adaptation from multiple-reference speakers. For the ATIS benchmarks, we ran a new system configuration which first produced a rank-ordered list of the N-best word-sequence hypotheses. The list of hypotheses was then reordered using more detailed acoustic and language models. In the ATIS benchmarks, we report SI recognition results on two conditions. The first is a baseline condition using only training data available from NIST on CD-ROM and a word-based statistical bi-gram grammar developed at MIT/Lincoln. In the second condition, we added training data from speakers collected at BBN and used a 4-gram class grammar. These changes reduced the word error rate by 25%.

DTIC

Education; Information Systems; Speech Recognition

20070005311 SRI International Corp., Menlo Park, CA USA

Stressed and Unstressed Pronouns: Complementary Preferences

Kameyama, Megumi; Aug 27, 1996; 23 pp.; In English

Contract(s)/Grant(s): IRI-9314961

Report No.(s): AD-A459950; SRI-TN-545-REV; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459950; Avail.: CASI: A03, Hardcopy

I present a unified account of interpretation preferences of stressed and unstressed pronouns in discourse. The central intuition is the Complementary Preference Hypothesis that predicts the interpretation preference of a stressed pronoun from that of an unstressed pronoun in the same discourse position. The base preference must be computed in a total pragmatics module including commonsense preferences. The focus constraint in Rooth's theory of semantic focus is interpreted to be the salient subset of the domain in the local attentional state in the discourse context independently motivated for other purposes in Centering Theory.

DTIC

Linguistics; Natural Language Processing; Semantics

20070005321 Baker (Wilfred) Engineering, Inc., San Antonio, TX USA

Selectivity of Local Field Potentials in Macaque Inferior Temporal Cortex

Kreiman, Gabriel; Hung, Chou; Poggio, Tomaso; DiCarlo, James; Sep 2004; 42 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459966; MIT-AI-MEMO-2004-020; MIT-CBCL-MEMO-240; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459966; Avail.: CASI: A03, Hardcopy

While single neurons in inferior temporal (IT) cortex show differential responses to distinct complex stimuli, little is known about the responses of populations of neurons in IT. We recorded single electrode data, including multi-unit activity (MUA) and local field potentials (LFP), from 618 sites in the inferior temporal cortex of macaque monkeys while the animals passively viewed 78 different pictures of complex stimuli. The LFPs were obtained by low-pass filtering the extracellular electrophysiological signal with a corner frequency of 300 Hz. As reported previously, we observed that spike counts from MUA showed selectivity for some of the pictures. Strikingly, the LFP data, which is thought to constitute an average over large numbers of neurons, also showed significantly selective responses. The LFP responses were less selective than the MUA responses both in terms of the proportion of selective sites as well as in the selectivity of each site. We observed that there was only little overlap between the selectivity of MUA and LFP recordings from the same electrode. To assess the spatial organization of selective responses, we compared the selectivity of nearby sites recorded along the same penetration and sites recorded from different penetrations. We observed that MUA selectivity was correlated on spatial scales up to 800 micrometers while the LFP selectivity was correlated over a larger spatial extent, with significant correlations between sites separated by

several mm. Our data support the idea that there is some topographical arrangement to the organization of selectivity in inferior temporal cortex and that this organization may be relevant for the representation of object identity in IT.
DTIC
Cells (Biology); Cerebral Cortex; Monkeys; Nervous System

20070005338 SRI International Corp., Menlo Park, CA USA
Learning and Recognition in Natural Environments
Pentland, Alex P; Bolles, R; Jun 5, 1987; 34 pp.; In English
Contract(s)/Grant(s): DACA76-85-C-0004; DCR-83-12766
Report No.(s): AD-A459990; SRI-TN-421; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459990; Avail.: Defense Technical Information Center (DTIC)

We present a system for learning descriptions of objects, and for subsequently recognizing learned objects, that functions in outdoor, natural environments. We describe in detail two modes of functioning within this system: (1) unguided, bottom-up learning of object descriptions directly from image data; (2) top-down recognition of objects whose approximate position and structure are known by use of image-level matching. We then argue that the systems's performance in these two modes indicates that robust outdoor performance can be achieved within the structure of our vision system.
DTIC
Computer Vision; Machine Learning

20070005340 SRI International Corp., Menlo Park, CA USA
Object-Centered Surface Reconstruction: Combining Multi-Image Stereo and Shading
Fua, P; Leclerc, Y G; Jan 1995; 38 pp.; In English
Report No.(s): AD-A459994; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459994; Avail.: Defense Technical Information Center (DTIC)

Our goal is to reconstruct both the shape and reflectance properties of surfaces from multiple images. We argue that an object-centered representation is most appropriate for this purpose because it naturally accommodates multiple sources of data, multiple images (including motion sequences of a rigid object), and self-occlusions. We then present a specific object-centered reconstruction method and its implementation. The method begins with an initial estimate of surface shape provided, for example, by triangulating the result of conventional stereo. The surface shape and reflectance properties are then iteratively adjusted to minimize an objective function that combines information from multiple input images. The objective function is a weighted sum of stereo, shading, and smoothness components, where the weight varies over the surface. For example, the stereo component is weighted more strongly where the surface projects onto highly textured areas in the images, and less strongly otherwise. Thus, each component has its greatest influence where its accuracy is likely to be greatest. Experimental results on both synthetic and real images are presented.
DTIC
Computer Vision; Image Processing

20070005345 SRI International Corp., Menlo Park, CA USA
Registration without Correspondences
Fua, Pascal V; Leclerc, Yvan G; Aug 20, 1994; 19 pp.; In English
Contract(s)/Grant(s): DACA76-92-C-0008; DACA76-92-C-0034
Report No.(s): AD-A460014; SRI-TN-537-REV; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460014; Avail.: Defense Technical Information Center (DTIC)

In this paper, we present a method for registering images of complex 3-D surfaces that does not require explicit correspondences between features across the images. Our method relies on the use of a full 3-D model of the surface to adjust the position and orientation of the camera by minimizing an objective function based on the projections of the images onto the model. This approach constrains the camera parameters strongly enough so that the models do not need, initially, to be accurate to yield good results. When registration has been achieved, the models can be refined and the fine details recovered. We use the 3-D surface models to adjust not only the surface's shape but also the position and orientation of the cameras by minimizing an objective function based on the projections of the model into the images. The method presented here complements our approach, described in previous publications, to the recovery of 3-D surface models from multiple images whose camera parameters are known. Our method is applicable to the calibration of stereo imagery, the precise registration of new images of a scene and the tracking of deformable objects. It can therefore lead to important applications in fields such

as augmented reality in a medical context or data compression for transmission purposes. We demonstrate its applicability by using both synthetic images and real images of faces and of terrain.
DTIC
Calibrating; Image Processing; Pattern Registration

20070005371 SRI International Corp., Menlo Park, CA USA
Using 3-Dimensional Meshes to Combine Image-Based and Geometry Constraints
Fua, Pascal V; Leclerc, Yvan G; Aug 24, 1994; 31 pp.; In English
Contract(s)/Grant(s): DACA76-92-C-0008; DACA76-92-C-0034
Report No.(s): AD-A460009; SRI-TN-536-REV; No Copyright; Avail.: CASI: A03, Hardcopy

A unified framework for 3-D shape reconstruction allows us to combine image-based and geometry-based information sources. The image information is akin to stereo and shape-from-shading, while the geometric information may be provided in the form of 3-D points, 3-D features or 2-D silhouettes. A formal integration framework is critical in recovering complicated surfaces because the information from a single source is often insufficient to provide a unique answer. Our approach to shape recovery is to deform a generic object-centered 3-D representation of the surface so as to minimize an objective function. This objective function is a weighted sum of the contributions of the various information sources. We describe these various terms individually, our weighting scheme, and our optimization method. Finally, we present results on a number of difficult images of real scenes for which a single source of information would have proved insufficient.
DTIC
Image Analysis; Image Processing; Shapes

20070005378 Massachusetts Univ., Amherst, MA USA
UMass at TREC 2002: Cross Language and Novelty Tracks
Larkey, Leah S; Allan, James; Connell, Margaret E; Bolivar, Alvaro; Wade, Courtney; Jan 2002; 13 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N66001-99-1-8912; N66001-02-1-8903
Report No.(s): AD-A460055; No Copyright; Avail.: CASI: A03, Hardcopy

The University of Massachusetts participated in the cross-language and novelty tracks this year. The cross-language submission was characterized by combination of evidence to merge results from two different retrieval engines and a variety of different resources - stemmers, dictionaries, machine translation, and an acronym database. We found that proper names were extremely important in this year's queries. For the novelty track, we applied variants of techniques that have been employed for other problems. In addition, we created additional training data by manually annotating 48 additional topics.
DTIC
Machine Translation; Queueing Theory

20070005403 Naval Academy, Annapolis, MD USA
New Hyperspectral Discrimination Measure for Spectral Characterization
Du, Yingzi; Chang, Chein-I; Ren, Hsuan; Chang, Chein-Chi; Jensen, James O; D'Amico, Francis M; Feb 17, 2004; 11 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460090; No Copyright; Avail.: CASI: A03, Hardcopy

The spectral angle mapper (SAM) has been widely used in multispectral and hyperspectral image analysis to measure spectral similarity between substance signatures for material identification. It has been shown that the SAM is essentially the Euclidean distance when the spectral angle is small. Most recently, a stochastic measure, called the spectral information divergence (SID), has been suggested to model the spectrum of a hyperspectral image pixel as a probability distribution, so that spectral variations among spectral bands can be captured more effectively in a stochastic manner. This paper develops a new hyperspectral spectral discrimination measure, which combines the SID and the SAM into a mixed measure. More specifically, let r and r' denote two hyperspectral image pixel vectors with their corresponding spectra speci- fied by s and s'. Then SAM(s,s') measures the spectral angle between s and s'. Similarly, SID(s,s') measures the information divergence between the probability distributions generated by s and s'. The proposed new measure, referred to as the SID-SAM mixed measure, can be implemented in two versions, given by SID(s,s')X tan(SAM(s,s')) and SID(s,s')X sin(SAM(s,s')), where tan and sin are the usual trigonometric functions. The spectral discriminability of such a mixed measure is greatly enhanced by multiplying the spectral abilities of the two measures. In order to demonstrate its utility, a comparative study is conducted among the SID-SAM mixed measure, the SID, and the SAM. Our experimental results have shown that the discriminatory

ability of the (SID,SAM) mixed measure can be a significant improvement over the SID and SAM.
DTIC
Characterization; Imagery; Mapping; Spectra; Spectrum Analysis; Stochastic Processes

20070005448 Army Tank-Automotive and Armaments Command, Warren, MI USA
The Bekker Model Analysis for Small Robotic Vehicles
Gerhart, Grant R; Jul 29, 2004; 10 pp.; In English
Report No.(s): AD-A460159; No Copyright; Avail.: CASI: A02, Hardcopy

This paper uses the Bekker model for land locomotion analysis to compare ground vehicle vehicles with different running gear configurations. The Bekker model is inherently phenomenological in nature and requires empirical data to both calibrate and validate the methodology for realistic soil/terrain conditions. This formalism consists of two fundamental equations. The first uses the Coulomb-Mohr law and a linear, one degree of freedom spring/mass/damper model to predict terrain shear rates from maximum vehicle tractive effort. The second empirically predicts soil sinkage as a function of ground pressure loading. The latter contains no phenomenological link to the continuum mechanics of terrain materials and conditions.
DTIC
Locomotion; Robotics; Transportation

20070005465 Mitre Corp., Bedford, MA USA
Authentication Tests and the Structure of Bundles
Guttman, Joshua D; Fabrega, F J; Nov 13, 2000; 56 pp.; In English
Contract(s)/Grant(s): DAAB07-99-C-C201
Report No.(s): AD-A460189; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available
Bundles; Computer Information Security; Cryptography

20070005479 University of Southern California, Marina del Rey, CA USA
Applying Perceptually Driven Cognitive Mapping to Virtual Urban Environments
Hill, Jr , Randall W; Han, Changhee; van Lent, Michael; Jan 2002; 9 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAAD19-99-C-0046
Report No.(s): AD-A460290; No Copyright; Avail.: CASI: A02, Hardcopy

This paper describes a method for building a cognitive map of a virtual urban environment. Our routines enable virtual humans to map their environment using a realistic model of perception. We based our implementation on a computational framework proposed by Yeap and Jefferies (Yeap & Jefferies 1999) for representing a local environment as a structure called an Absolute Space Representation (ASR). Their algorithms compute and update ASRs from a 2-1/2D sketch of the local environment, and then connect the ASRs together to form a raw cognitive map. Our work extends the framework developed by Yeap and Jefferies in three important ways. First, we implemented the framework in a virtual training environment, the Mission Rehearsal Exercise (Swartout et al. 2001). Second, we describe a method for acquiring a 2- 1/2D sketch in a virtual world, a step omitted from their framework, but which is essential for computing an ASR. Third, we extend the ASR algorithm to map regions that are partially visible through exits of the local space. Together, the implementation of the ASR algorithm along with our extensions will be useful in a wide variety of applications involving virtual humans and agents who need to perceive and reason about spatial concepts in urban environments.
DTIC
Cities; Cognition; Mapping; Virtual Reality

20070005511 Michigan Univ., Ann Arbor, MI USA
Towards a Factored Analysis of Legged Locomotion Models
Altendorfer, Richard; Koditschek, Daniel E; Holmes, Philip; Jan 2002; 10 pp.; In English
Contract(s)/Grant(s): N00014-98-1-0747
Report No.(s): AD-A460353; No Copyright; Avail.: CASI: A02, Hardcopy

In this paper, we report on a new stability analysis for hybrid legged locomotion systems based on factorization of return maps. We apply this analysis to a family of models of the Spring Loaded Inverted Pendulum (SLIP) with different leg recirculation strategies. We obtain a necessary condition for the asymptotic stability of those models, which is formulated as an exact algebraic expression despite the non-integrability of the SLIP dynamics. We outline the application of this analysis

to other models of legged locomotion and its importance for the stability of legged robots and animals.
DTIC
Locomotion; Robots

20070005512 University of Southern California, Marina del Rey, CA USA
Training Tree Transducers
Graehl, Jonathan; Knight, Kevin; Jan 2004; 9 pp.; In English
Contract(s)/Grant(s): F49620-00-1-0337; MDA904-02-C-450
Report No.(s): AD-A460355; No Copyright; Avail.: CASI: A02, Hardcopy

Many probabilistic models for natural language are now written in terms of hierarchical tree structure. Tree-based modeling still lacks many of the standard tools taken for granted in (finite-state) string-based modeling. The theory of tree transducer automata provides a possible framework to draw on, as it has been worked out in an extensive literature. We motivate the use of tree transducers for natural language and address the training problem for probabilistic tree-to-tree and tree-to-string transducers.
DTIC
Education; Hierarchies; Mathematical Models; Natural Language (Computers); Strings; Transducers

64
NUMERICAL ANALYSIS

Includes iteration, differential and difference equations, and numerical approximation.

20070003549 Massachusetts Inst. of Tech., Cambridge, MA USA
Fast Approximation Schemes for Multi-Criteria Flow, Knapsack, and Scheduling Problems
Jan 1995; 52 pp.; In English
Contract(s)/Grant(s): AFOSR-88-0088; NSF-DDM-8921835
Report No.(s): AD-A459693; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available
Approximation; Scheduling; Optimization; Problem Solving

20070003629 Massachusetts Inst. of Tech., Cambridge, MA USA
A Capacity Scaling Algorithm for the Constrained Maximum Flow Problem
Jul 1993; 23 pp.; In English
Contract(s)/Grant(s): AFOSR-88-0088
Report No.(s): AD-A459686; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Algorithms; Scaling; Problem Solving; Flow Theory

20070003636 Massachusetts Inst. of Tech., Cambridge, MA USA
Toward a Theory of Nonlinear Stochastic Realization
Oct 1981; 17 pp.; In English
Contract(s)/Grant(s): AFOSR-78-3519; AFOSR-77-3281D
Report No.(s): AD-A459661; LIDS-P-1154; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Nonlinearity; Stochastic Processes; Numerical Analysis; Theorems

20070003676 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, NASA Ames Research Center, Moffett Field, CA, USA
HARP: A Fast Spectral Partitioner
Simon, Horst D.; Sohn, Andrew; Biswas, Rupak; [1997]; 10 pp.; In English; Ninth ACM Symposium on Parallel Algorithms and Architectures, June 1997, Newport, RI, USA; Original contains black and white illustrations
Contract(s)/Grant(s): NAS2-14303
Report No.(s): NAS-96-009; Copyright; Avail.: CASI: A02, Hardcopy

Partitioning unstructured graphs is central to the parallel solution of computational science and engineering problems. Spectral partitioners, such recursive spectral bisection (RSB), have proven effective in generating high-quality partitions of realistically-sized meshes. The major problem which hindered their widespread use was their long execution times. This paper presents a new inertial spectral partitioner, called HARP. The main objective of the proposed approach is to quickly partition the meshes at runtime in a manner that works efficiently for real applications in the context of distributed-memory machines. The underlying principle of HARP is to find the eigenvectors of the unpartitioned vertices and then project them onto the eigenvectors of the original mesh. Results for various meshes ranging in size from 1000 to 100,000 vertices indicate that HARP can indeed partition meshes rapidly at runtime. Experimental results show that our largest mesh can be partitioned sequentially in only a few seconds on an SP2 which is several times faster than other spectral partitioners while maintaining the solution quality of the proven RSB method. A parallel MPI version of HARP has also been implemented on IBM SP2 and Cray T3E. Parallel HARP, running on 64 processors SP2 and T3E, can partition a mesh containing more than 100,000 vertices into 64 subgrids in about half a second. These results indicate that graph partitioning can now be truly embedded in dynamically-changing real-world applications.

Author

Partitions (Mathematics); Unstructured Grids (Mathematics); Genetic Algorithms; Euclidean Geometry; Parallel Processing (Computers)

20070003688 NASA Johnson Space Center, Houston, TX, USA

Comparison of Fixed and Variable Time Step Trajectory Integration Methods for Cislunar Trajectories

Weeks, ichael W.; Thrasher, Stephen W.; [2007]; 16 pp.; In English; 17th AAS/AIAA Space Flight Mechanics Conference, 28 Jan. - 1 Feb. 2007, Sedona, AZ, USA; Copyright; Avail.: CASI: A03, Hardcopy

Due to the nonlinear nature of the Earth-Moon-Sun three-body problem and non-spherical gravity, CEV cislunar targeting algorithms will require many propagations in their search for a desired trajectory. For on-board targeting especially, the algorithm must have a simple, fast, and accurate propagator to calculate a trajectory with reasonable computation time, and still be robust enough to remain stable in the various flight regimes that the CEV will experience. This paper compares Cowell s method with a fourth-order Runge- Kutta integrator (RK4), Encke s method with a fourth-order Runge-Kutta- Nystr m integrator (RKN4), and a method known as Multi-Conic. Additionally, the study includes the Bond-Gottlieb 14-element method (BG14) and extends the investigation of Encke-Nystrom methods to integrators of higher order and with variable step size.

Author

Trajectories; Cislunar Space; Numerical Integration; Measure and Integration; Three Body Problem

20070003698 Massachusetts Inst. of Tech., Cambridge, MA USA

Generalized Riccati Equations for Two-Point Boundary-Value Descriptor Systems

Aug 1987; 4 pp.; In English

Contract(s)/Grant(s): AFOSR-82-0258; ECS-8700903

Report No.(s): AD-A459611; LIDS-P-1701; No Copyright; Avail.: CASI: A01, Hardcopy

No abstract available

Riccati Equation; Boundary Value Problems; Applications of Mathematics

20070003699 Massachusetts Inst. of Tech., Cambridge, MA USA

Metropolis-type Annealing Algorithms for Global Optimization in IRd

May 1990; 31 pp.; In English

Contract(s)/Grant(s): AFOSR-89-0276

Report No.(s): AD-A459610; LIDS-P-1977; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Algorithms; Annealing; Optimization

20070003700 Delaware Univ., Newark, DE USA

The Inverse Source Problem for Maxwell's Equations

Albanese, Richard A; Monk, Peter B; Oct 2006; 14 pp.; In English

Contract(s)/Grant(s): FA8650-04-1-6535; Proj-7184

Report No.(s): AD-A459256; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459256; Avail.: CASI: A03, Hardcopy

The inverse source problem for Maxwell's equations is considered. We show that the problem of finding a volume current density from surface measurements does not have a unique solution, and we characterize the non-uniqueness. We also show that if further information is available the inverse source problem may have a unique solution. The method is useful for the quantitative determination of interior brain currents from surface electroencephalographic measurements. The application is to prosthesis control.
DTIC
Maxwell Equation; Problem Solving

20070003707 George Washington Univ., Washington, DC USA
The Normal Kernel Coupler: An Adaptive Markov Chain Monte Carlo Method for Efficiently Sampling From Multi-Modal Distributions
Mar 1, 2001; 38 pp.; In English
Contract(s)/Grant(s): N00014-96-1-0192
Report No.(s): AD-A459460; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Kernel Functions; Monte Carlo Method; Markov Chains; Sampling

20070003709 Drexel Univ., Philadelphia, PA USA
On Achieving Fairness in the Joint Allocation of Processing and Bandwidth Resources: Principles and Algorithms
Jul 2003; 16 pp.; In English
Contract(s)/Grant(s): F30602-00-2-0501; NSF-CCR-9984161
Report No.(s): AD-A459450; DU-CS-03-02; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Algorithms; Bandwidth

20070003713 Massachusetts Inst. of Tech., Cambridge, MA USA
The Schur Algorithm and Its Applications
Feb 1984; 57 pp.; In English
Contract(s)/Grant(s): AFOSR-82-0135A
Report No.(s): AD-A459351; LIDS-P-1362; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available
Algorithms; Numerical Analysis

20070003714 Massachusetts Inst. of Tech., Cambridge, MA USA
Parallel Smoothing Algorithms for Casual and Acausal Systems
Mar 1991; 20 pp.; In English
Contract(s)/Grant(s): DAAL03-86-K-0171; AFOSR-88-0032
Report No.(s): AD-A459350; LIDS-P-2027; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Algorithms; Parallel Computers; Data Smoothing

20070003837 Carnegie-Mellon Univ., Pittsburgh, PA USA
Response Surface Methodology
Carley, Kathleen M; Kamneva, Natalia Y; Reminga, Jeff; Oct 2004; 32 pp.; In English
Contract(s)/Grant(s): N00014-97-1-0037; NAG-2-1569
Report No.(s): AD-A459032; CMU-ISRI-04-136; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459032; Avail.: CASI: A03, Hardcopy

There is a problem faced by experimenters in many technical fields, where, in general, the response variable of interest is y, and there is a set of predictor variables x1, x2,...xk. For example, in Dynamic Network Analysis (DNA) Response Surface Methodology (RSM) might be useful for sensitivity analysis of various DNA measures for different kinds of random groups and errors.
DTIC
Responses; Methodology; Network Analysis

20070003839 Yale Univ., New Haven, CT USA

Diagonal Representation of Certain Matrices

Tygert, Mark; Dec 21, 2004; 5 pp.; In English

Report No.(s): AD-A458941; YALEU/DCS/RR-1313; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA458941; Avail.: CASI: A01, Hardcopy

An explicit expression is provided for the characteristic polynomial of a matrix M of the form M = D - (0 over ba(T) ab(T) over 0), where D is a diagonal matrix, and a and b are column vectors. Also, an explicit expression is provided for the matrix of normalized eigenvectors of M, in terms of the roots of the characteristic polynomial (i.e., in terms of the eigenvalues of M).

DTIC

Matrices (Mathematics); Eigenvectors

20070003842 Yale Univ., New Haven, CT USA

On Interpolation and Integration in Finite-Dimensional Spaces of Bounded Functions

Martinsson, Per-Gunnar; Rokhlin, Vladimir; Tygert, Mark; Mar 9, 2005; 8 pp.; In English

Contract(s)/Grant(s): F49620-03-C-0041; DMS-0139914

Report No.(s): AD-A458904; YALEU/DCS/RR-1317; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA458904; Avail.: CASI: A02, Hardcopy

We observe that, under very mild conditions, an n-dimensional space of functions (with a finite n) admits numerically stable n-point interpolation and integration formulae. The proof relies entirely on linear algebra, and is virtually independent of the domain and of the functions to be interpolated.

DTIC

Interpolation; Numerical Analysis

20070003850 Washington Univ., Seattle, WA USA

Long-Run Performance of Bayesian Model Averaging

Jul 17, 2003; 25 pp.; In English

Contract(s)/Grant(s): N00014-01-1-0745

Report No.(s): AD-A459659; TR-433; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Bayes Theorem; Average; Performance Tests

20070003852 University of Southern California, Marina del Rey, CA USA

Evaluating a Computational Model of Emotion

Gratch, Jonathan; Marsella, Stacy; Jan 2006; 15 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459183; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459183; Avail.: CASI: A03, Hardcopy

Spurred by a range of potential applications, there has been a growing body of research in computational models of human emotion. To advance the development of these models, it is critical that we evaluate them against the phenomena they purport to model. In this paper, we present one method to evaluate an emotion model that compares the behavior of the model against human behavior using a standard clinical instrument for assessing human emotion and coping. We use this method to evaluate the EMA model of emotion. The evaluation highlights strengths of the approach and identifies where the model needs further development.

DTIC

Emotions; Mathematical Models; Human Behavior

20070003917 Massachusetts Inst. of Tech., Cambridge, MA USA

Nonlinear Dynamic Maximum Power Theorem, with Numerical Method

Sep 1983; 20 pp.; In English

Contract(s)/Grant(s): F29620-81-C-0054; N00014-80-C-0622

Report No.(s): AD-A459637; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Nonlinearity; Theorems; Numerical Analysis

20070004571 North Carolina State Univ., Raleigh, NC USA

Nonhydrostatic Numerical Investigations of Oscillating Flow over Sills: Generation of Internal Tides and Solitary Waves

Dec 20, 2006; 3 pp.; In English

Contract(s)/Grant(s): N00014-04-1-0430

Report No.(s): AD-A459629; No Copyright; Avail.: CASI: A01, Hardcopy

No abstract available

Internal Waves; Oscillating Flow; Solitary Waves

20070004766 Air Force Research Lab., Wright-Patterson AFB, OH USA

FDTD Analysis of a New Leaky Traveling Wave Antenna

Jul 2006; 6 pp.; In English

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

Report No.(s): AD-A459772; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Finite Difference Time Domain Method; Waveguide Antennas; Finite Difference Theory

20070004781 Maryland Univ., College Park, MD USA

Video Summarization by Curve Simplification

DeMenthon, Daniel; Kobla, Vikrant; Doermann, David; Jul 1998; 22 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): MDA904-96-C-1250

Report No.(s): AD-A459300; LAMP-TR-018; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459300; Avail.: CASI: A03, Hardcopy

A video sequence can be represented as a trajectory curve in a high dimensional feature space. This video curve can be analyzed by tools similar to those developed for planar curves. In particular, the classic binary curve splitting algorithm has been found to be a useful tool for video analysis. With a splitting condition that checks the dimensionality of the curve segment being split, the video curve can be recursively simplified and represented as a tree structure, and the frames that are found to be junctions between curve segments at different levels of the tree can be used as keyframes to summarize the video sequences at different levels of detail. These keyframes can be combined in various spatial and temporal configurations for browsing purposes. We describe a simple video player that displays the keyframes sequentially and lets the user change the summarization level on the fly with a slider. We also describe an approach to automatically selecting a summarization level that provides a concise and representative set of keyframes.

DTIC

Simplification; Sequencing; Display Devices

20070004876 Massachusetts Inst. of Tech., Cambridge, MA USA

Rollout Algorithms for Stochastic Scheduling Problems

Apr 1998; 28 pp.; In English

Contract(s)/Grant(s): F49620-97-C-0013

Report No.(s): AD-A459559; LIDS-P-2413; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Algorithms; Scheduling; Stochastic Processes

20070004927 Massachusetts Inst. of Tech., Cambridge, MA USA

Efficient Implementations of 2-D Noncasual IIR Filters

Mar 10, 1995; 43 pp.; In English

Contract(s)/Grant(s): N00014-91-J-1004; F49620-95-1-0083

Report No.(s): AD-A459571; LIDS-P-2294; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Signal Processing; IIR Filters; Two Dimensional Models

20070004928 Massachusetts Inst. of Tech., Cambridge, MA USA
Output Stabilizability of Discrete Event Dynamic Systems
Sep 1989; 7 pp.; In English
Contract(s)/Grant(s): AFOSR-88-0032; DAAL03-86-K0171
Report No.(s): AD-A459570; LIDS-P-1912; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Dynamical Systems; Discrete Functions; Stability; Automatic Control; Output

20070005188 Boston Univ., Boston, MA USA
Fast Search Algorithms for Connected Phone Recognition Using the Stochastic Segment Model
Digalakis, V; Ostendorf, M; Rohlicek, J R; Jan 1990; 7 pp.; In English
Contract(s)/Grant(s): NSF-IRI-8902124
Report No.(s): AD-A459580; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459580; Avail.: CASI: A02, Hardcopy

In this paper we present methods for reducing the computation time of joint segmentation and recognition of phones using the Stochastic Segment Model (SSM). Our approach to the problem is twofold: first, we present a fast segment classification method that reduces computation by a factor of 2 to 4, depending on the confidence of choosing the most probable model. Second, we propose a Split and Merge segmentation algorithm as an alternative to the typical Dynamic Programming solution of the segmentation and recognition problem, with computation savings increasing proportionally with model complexity. Even though our current recognizer uses context-independent phone models, the results that we report on the TIMIT database for speaker independent joint segmentation and recognition are comparable to that of systems that use context information.
DTIC

Algorithms; Mathematical Models; Speech Recognition; Stochastic Processes

20070005190 Johns Hopkins Univ., Baltimore, MD USA
Named Entity Recognition as a House of Cards: Classifier Stacking
Florian, Radu; Jan 2002; 5 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-01-1-0685; NSF-IIS-9985033
Report No.(s): AD-A459582; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459582; Avail.: CASI: A01, Hardcopy

This paper presents a classifier stacking-based approach to the named entity recognition task (NER henceforth). Transformation-based learning (Brill, 1995), Snow (sparse network of winnows (Mu oz et al., 1999)) and a forward-backward algorithm are stacked (the output of one classifier is passed as input to the next classifier), yielding considerable improvement in performance. In addition, in agreement with other studies on the same problem, the enhancement of the feature space (in the form of capitalization information) is shown to be especially beneficial to this task.
DTIC

Classifiers; Information Retrieval; Natural Language (Computers)

20070005195 Massachusetts Inst. of Tech., Cambridge, MA USA
Inversion of Generalized Parabolic Projections
Oebek, Ali; Levy, Bernard C; Mar 1987; 8 pp.; In English
Contract(s)/Grant(s): AFOSR-85-0227; ECS-83-12921
Report No.(s): AD-A459603; LIDS-P-1659; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459603; Avail.: CASI: A02, Hardcopy

The niultidimensional inverse scattering problem for all acoustic medium is considered within the homogeneous background Born approximation. A constant density acoustic medium is probed by a wideband plane wave source, and the scattered field is observed along a receiver array located outside the medium. The inversion problem is formulated as a generalized tomographic problem It is shown that the observed scattered field can be appropriately filtered so as to obtain generalized projections of the scattering potential. For a 2-D experimental geometry, these projections are weighted integrals of the scattering potential over regions of parabolic support. The inversion problem is therefor similar to that of x-ray tomography, except that instead of being given projections of the object to be reconstructed along straight lines, projections along parabolas are given. The inversion procedure that we propose is similar to the x-ray solution, in the sense that it consists of a back projection operation followed by 2-D space invariant filtering. A ‘Projection-Slice Theorem’ is derived relating the

generalized projections and the scattering potential in the Fourier transform domain.
DTIC
Fourier Transformation; Inversions; Parabolas

20070005197 Massachusetts Inst. of Tech., Cambridge, MA USA
A Hierarchical Algorithm for Neural Training and Control. Revision
Theodosopoulos, T V; Branicky, M S; Livstone, M M; Oct 1992; 11 pp.; In English
Contract(s)/Grant(s): F49620-86-C-0127
Report No.(s): AD-A459605; LIDS-P-2124-REV; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459605; Avail.: CASI: A03, Hardcopy

Lately, there has been an extensive interest in the possible uses of neural networks for nonlinear system identification and control. In this paper, we provide a framework for the simultaneous identification and control of a class of unknown, uncertain nonlinear systems. The identification portion relies on modeling the system by a neural network which is trained via a local variant of the Extended Kalman Filter. We will discuss this local algorithm for training a neural network to approximate a nonlinear feedback system. We also give a dynamic programming-based method of deriving near optimal control inputs for the real plant based on this approximation and a measure of its error (covariance). Finally, we combine these methods in a hierarchical algorithm for identification and control of a class of uncertain, unknown systems. The complexity of the whole algorithm is analyzed.
DTIC
Algorithms; Education; Neural Nets; Nonlinear Systems

20070005199 Massachusetts Inst. of Tech., Cambridge, MA USA
Layer by Layer Reconstruction Methods for the Earth Resistivity from Direct Current Measurements
Levy, Bernard C; May 1985; 40 pp.; In English
Contract(s)/Grant(s): ECS-83-12921; AFOSR-82-0135B
Report No.(s): AD-A459621; LIDS-P-1388-REV; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459621; Avail.: CASI: A03, Hardcopy

Several methods for reconstructing the resistivity profile of a layered, laterally homogeneous earth from direct current measurements are described. These methods recover the resistivity of the earth layer by layer in a recursive way, and require a very small amount of computational effort. They are obtained by transforming the inverse resistivity problem into an equivalent inverse scattering problem, and by applying efficient signal processing algorithms such as the Schur, fast Cholesky or Levinson recursions to the transformed problem. These algorithms operate on a layer stripping or layer accumulation principle, and are shown to be related to previous reconstruction techniques of Pekeris, Koefoed, Kunetz and Rocroi, and others.
DTIC
Algorithms; Direct Current; Electrical Resistivity; Inverse Scattering

20070005200 Massachusetts Inst. of Tech., Cambridge, MA USA
An Operator-Theoretic Approach to the Mixed-Sensitivity Minimization Problem
Fagnani, Fabio; Dec 1987; 33 pp.; In English
Contract(s)/Grant(s): AFOSR-85-0227
Report No.(s): AD-A459632; LIDS-P-1722; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459632; Avail.: CASI: A03, Hardcopy

In this paper, we consider the mixed-sensitivity minimization problem (scalar case). It gives rise to the so-called two-block problem on the algebra H(oo); we analyze this problem from an operator point of view, using Krein space theory. We obtain a necessary and sufficient condition for the uniqueness of the solution and a parameterization of all solutions in the non-uniqueness case. Moreover, an interpolation interpretation is given for the finite-dimensional case.
DTIC
Control Theory; Optimization; Sensitivity

20070005201 Massachusetts Inst. of Tech., Cambridge, MA USA
Simultaneous Inversion of Velocity and Density Profiles
Ozbek, Ali; Levy, Bernard C; May 1989; 6 pp.; In English
Contract(s)/Grant(s): AFOSR-85-0227; ECS-83-12921

Report No.(s): AD-A459642; LIDS-P-1875; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459642; Avail.: CASI: A02, Hardcopy

The multidimensional inverse scattering problem for an acoustic medium is considered within the homogeneous background Born approximation. The objective is to reconstruct simultaneously the velocity and density profiles of the medium. The medium is probed by wide-band plane-wave sources, and the time traces observed at the receivers are appropriately filtered to obtain generalized projections of the velocity and density scattering potentials, which are related to the velocity and density variations in the medium. The generalized projections are weighted integrals of the scattering potentials; in the two-dimensional geometry the weighting functions are concentrated along parabolas. The reconstruction problem for the generalized projections is formulated in a way similar to the problem of x-ray, or straight- line tomography. The solution is expressed as a back-projection operation followed by a two dimensional space-invariant filtering operation. In the Fourier domain, the resulting image is a inlinear combination of the velocity and density scattering potentials, where the coefficients depend on the angle of incidence of the probing wave. Therefore, two or more different angles of incidence are necessary to solve for the velocity and density scattering potentials separately. The technique of defining a back-projection operator and relating it to the unknown medium for the case of zero-offset problems,, where projections over circles arise, was introduced by Fawcett (1985). With a similar technique, Ozbek & Levy (1987) solved the velocity inversion problem in constant-density acoustic media under plane-wave illumination, where parabolic projections are the data. This work extends this work to the joint reconstruction of velocity and density. Only the 2D case is presented here, for the 3D case and more detailed development, see Ozbek & Levy (1988).

DTIC

Inversions; Plane Waves; Velocity Distribution

20070005224 Tata Inst. of Fundamental Research, Bombay, India

Lattice Approximation in the Stochastic Quantization of (04)2 Fields

Borkar, Vivek S; Mitter, Sanjoy K; Aug 1988; 12 pp.; In English

Contract(s)/Grant(s): DAAL03-86-K-0171; AFOSR-85-0277

Report No.(s): AD-A459749; LIDS-P-1807; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459749; Avail.: CASI: A03, Hardcopy

The Parisi-Wu program of stochastic quantization [8] involves construction of a stochastic process which has a prescribed Euclidean quantum field measure as its invariant measure. This program was rigorously carried out for a finite volume (phi superscript 4) sub 2 measure by G. Jona-Lasinio and P. K. Mitter in [6]. These results were extended in [2], which also proves a finite to infinite volume limit theorem. The aim of this note is to prove a related limit theorem, viz., that of the finite dimensional processes obtained by stochastic quantization of the lattice (phi superscript 4) sub 2 fields to their continuum limit, i.e., the (phi superscript 4) sub 2 process of [2], [6]. The proof imitates that of the limit theorem of [2] in broad terms, though the technical details differ. Note that this limit theorem can also be construed as an alternative construction of the (phi superscript 4)sub 2 process - in finite volume. - The next section recalls the finite volume (phi superscript 4)sub 2 process. Section III summarizes the relevant facts about the lattice approximation to the (phi superscript 4)sub 2 field from Sections 9.5 and 9.6 of [4]. Section IV proves the limit theorem.

DTIC

Approximation; Measurement; Stochastic Processes

20070005237 Washington Univ., Seattle, WA USA

Design Issues on Broadcast Routing Algorithms using Realistic Cost-Effective Smart Antenna Models

Kang, Intae; Poovendran, Radha; Jan 2004; 6 pp.; In English

Contract(s)/Grant(s): DAAD19-02-1-0242; NSF-ANI-0093187

Report No.(s): AD-A459825; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459825; Avail.: CASI: A02, Hardcopy

Wireless ad hoc or sensor networks usually operate over strictly or partially battery energy limited environment. To prolong the network operation time, energy-efficiency should be carefully considered at every layer of the network protocols and algorithms. Moreover, cross-layer effects and interactions have to be carefully analysed and utilized. While a significant amount of research on directional and smart antennas has been conducted at the physical layer and device level, a system-wide level analysis using directional antennas is still very rare especially for the broadcast routing problem over wireless ad hoc networks. In this paper we investigate the effects of various classes of directional antenna systems and consider system-level

design principles for a power-efficient broadcast routing algorithm. By introducing the concept of optimal decision space, we provide various valuable insights for algorithm design.
DTIC
Algorithms; Broadcasting; Cost Effectiveness; Radiotelephones

20070005244 Massachusetts Inst. of Tech., Lexington, MA USA
BSAR Computational Analysis and Proposed Mapping. Revision 1
Arakawa, M; Nov 30, 2006; 65 pp.; In English
Contract(s)/Grant(s): FA8721-05-C-0002; Proj-1048
Report No.(s): AD-A459834; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459834; Avail.: CASI: A04, Hardcopy

This report details the MIT Lincoln Laboratory computational performance analysis of the CBASS BSAR. We describe: (1) the BSAR algorithm, in both the original mode and the new, default mode; (2) the algorithm's computational workload for both nodes; (3) the 12-Hammerhead DR on which the BSAR algorithm is executed; (4) a proposed mapping of the algorithm onto the DR; (5) an estimated execution time for the algorithm in both modes using the proposed mapping; (6) a memory usage analysis. Our analysis indicates that the DR will be able to handle the BSAR algorithm in both the original and the new, default modes with sufficient spare processor capacity. Furthermore, there is sufficient memory for the various input, intermediate, and output data products, although some of the memory margin will be consumed in the original algorithm mode.
DTIC
Algorithms; Analysis (Mathematics); Fast Fourier Transformations; Mapping

20070005249 Massachusetts Inst. of Tech., Cambridge, MA USA
Multiresolution Optimal Interpolation and Statistical Analysis of Topex/Poseidon Satellite Altimetry
Fieguth, P W; Karl, W C; Willsky, A S; Wunsch, C; Oct 1, 1994; 31 pp.; In English
Contract(s)/Grant(s): N00014-91-J-1004; F49620-92-J-0002
Report No.(s): AD-A459844; LIDS-P-2271; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459844; Avail.: CASI: A03, Hardcopy

A recently developed multiresolution estimation framework offers the possibility of highly efficient statistical analysis, interpolation, and smoothing of extremely large data sets in a multiscale fashion. This framework enjoys a number of advantages not shared by other statistically-based methods. In particular, the algorithms resulting from this framework have complexity that scales only linearly with problem size, yielding constant complexity load per grid point independent of problem size. Furthermore these algorithms directly provide interpolated estimates at multiple resolutions, accompanying error variance statistics of use in assessing resolution/accuracy tradeoffs and in detecting statistically significant anomalies, and maximum likelihood estimates of parameters such as spectral power law coefficients. this paper, we demonstrate a realization of this potential by applying the multiresolution framework to a problem of considerable current interest - the interpolation and statistical analysis of ocean surface data from the Topex/ Poseidon altimeter.
DTIC
Algorithms; Image Resolution; Interpolation; Poseidon Satellite; Satellite Altimetry; Statistical Analysis; Topex

20070005250 Massachusetts Inst. of Tech., Cambridge, MA USA
Fractal Estimation using Models on Multiscale Trees
Fieguth, Paul W; Willsky, Alan S; Jan 1995; 14 pp.; In English
Contract(s)/Grant(s): N00014-91-J-1004; F49620-93-1-0604
Report No.(s): AD-A459845; LIDS-P-2287; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459845; Avail.: CASI: A03, Hardcopy

In this paper we estimate the fractal dimension of stochastic processes with 1/f-like spectra by applying a recently-introduced multiresolution framework. This framework admits an efficient likelihood function evaluation, allowing us to compute the maximum likelihood estimate of this fractal parameter with relative ease. In addition to yielding results that compare well to other proposed methods. and in contrast to other approaches, our method is directly applicable, with at most very simple modification, in a variety of other contexts including fractal estimation given irregularly sampled data or nonstationary measurement noise and the estimation of fractal parameters for 2-D random fields.
DTIC
Fractals; Stochastic Processes

20070005295 Maryland Univ., Baltimore, MD USA
Estimating Grammar Parameters using Bounded Memory
Oates, Tom; Heeringa, Brent; Jan 2002; 15 pp.; In English
Contract(s)/Grant(s): DASG60-99-C-0074
Report No.(s): AD-A459912; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459912; Avail.: CASI: A03, Hardcopy

Estimating the parameters of stochastic context-free grammars (SCFGs) from data is an important, well-studied problem. Almost without exception, existing approaches make repeated passes over the training data. The memory requirements of such algorithms are ill-suited for embedded agents exposed to large amounts of training data over long periods of time. We present a novel algorithm, called HOLA, for estimating the parameters of SCFGs that computes summary statistics for each string as it is observed and then discards the string. The memory used by HOLA is bounded by the size of the grammar, not by the amount of training data. Empirical results show that HOLA performs as well as the Inside-Outside algorithm on a variety of standard problems, despite the fact that it has access to much less information.
DTIC
Algorithms; Context Free Languages; Estimating; Grammars; Stochastic Processes

20070005298 Massachusetts Univ., Amherst, MA USA
Two Algorithms for Learning the Parameters of Stochastic Context-Free Grammars
Heeringa, Brent; Oates, Tim; Jan 2001; 7 pp.; In English
Contract(s)/Grant(s): DASG60-99-C-0074
Report No.(s): AD-A459920; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459920; Avail.: CASI: A02, Hardcopy

Stochastic context-free grammars (SCFGs) are often used to represent the syntax of natural languages. Most algorithms for learning them require storage and repeated processing of a sentence corpus. The memory and computational demands of such algorithms are illsuited for embedded agents such as a mobile robot. Two algorithms are presented that incrementally learn the parameters of stochastic context-free grammars as sentences are observed. Both algorithms require a fixed amount of space regardless of the number of sentence observations. Despite using less information than the inside-outside algorithm, the algorithms perform almost as well.
DTIC
Algorithms; Context Free Languages; Grammars; Stochastic Processes

20070005299 Massachusetts Univ., Amherst, MA USA
A Framework for Learning Declarative Structure
Hart, Stephen; Ou, Shichao; Sweeney, John; Grupen, Rod; Jan 2006; 6 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-05-1-0396; NNJ05HB61A-5710001842
Report No.(s): AD-A459921; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459921; Avail.: CASI: A02, Hardcopy

This paper provides a framework with which a humanoid robot can efficiently learn complex behavior. In this framework, a robot is rewarded by learning how to generate novel sensorimotor feedback a form of native motivation. This intrinsic drive biases the robot to learn increasingly complex knowledge about itself and its effect on the environment. The framework includes a mechanism for uncovering hidden state in a well-structured state and action space. We present an example wherein the robot, Dexter, learns a sequence of manual skills: (1) searching for and grasping an object, (2) the length of its arms, and (3) how to portray its intentions to human teachers in order to induce them to help.
DTIC
Feedback; Machine Learning; Robots

20070005307 University of Southern California, Marina del Rey, CA USA
Fast Decoding and Optimal Decoding for Machine Translation
Germann, Ulrich; Jahr, Michael; Knight, Kevin; Marcu, Daniel; Yamada, Kenji; Jan 2001; 9 pp.; In English
Contract(s)/Grant(s): N66001-00-1-9814
Report No.(s): AD-A459945; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459945; Avail.: CASI: A02, Hardcopy

A good decoding algorithm is critical to the success of any statistical machine translation system. The decoder's job is to find the translation that is most likely according to set of previously learned parameters (and a formula for combining them). Since the space of possible translations is extremely large, typical decoding algorithms are only able to examine a portion of it, thus risking to miss good solutions. In this paper, we compare the speed and output quality of a traditional stack-based decoding algorithm with two new decoders: a fast greedy decoder and a slow but optimal decoder that treats decoding as an integer-programming optimization problem.

DTIC

Algorithms; Decoding; Machine Translation

20070005333 Massachusetts Inst. of Tech., Cambridge, MA USA

Conditions for Scale-Based Decompositions in Singularly Perturbed Systems

Lou, Sheldon X; Verghese, George C; Willsky, Alan S; Coxson, Pamela G; Feb 1987; 26 pp.; In English

Contract(s)/Grant(s): AFOSR-82-0258

Report No.(s): AD-A459985; MIT-LIDS-P-1651; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459985; Avail.: CASI: A03, Hardcopy

Singularly perturbed models of the form x(t) = A(epsilon)x(t), with A(epsilon) analytic at 0, nonsingular for epsilon Epsilon (0, epsilon 0] and singular at epsilon = 0, arise naturally in various problems of systems and control theory. Under a so-called multiple semi-simple null structure or MSSNS condition on A(epsilon), the eigenstructure of this matrix has a multiple scale property that allows the asymptotic eigenstructure of the matrix to be studied via reduced-order matrices associated with the separate scales. Under a stronger multiple semi-stability or MSST condition, this eigenstructure decomposition translates into a time-scale decomposition of the solution x(t) of the system. This paper is aimed at illuminating the MSSNS and MSST conditions.

DTIC

Decomposition; Perturbation Theory

20070005401 Defence Science and Technology Organisation, Edinburgh, Australia

Structural Uncertainties in Numerical Induction Models

Warren, Lewis; Jul 2006; 61 pp.; In English

Report No.(s): AD-A460088; DSTO-TR-1895; No Copyright; Avail.: CASI: A04, Hardcopy

This report delineates a number of ways in which the results of numerical induction models, which aggregate lower measures into meta-measures for decision making, can be unnecessarily compromised. Examples of numerical induction models include complex models for performance evaluation, measures of effectiveness synthesis, and for strategic decision analysis. A framework is proposed for identifying different types of modelling uncertainly that may be present and several of these uncertainties are discussed in detail. Some popular decision analysis techniques are also analyzed highlighting any features that may introduce unnecessary uncertainly into the results. The purpose of describing these potential pitfalls is to reduce the structural uncertainty forms that may be unwittingly added to the uncertainties that already exist in the input information leading to outputs that are more meaningful. More meaningful outputs should then naturally result in improved decisions when such models are applied to Defense problems.

DTIC

Mathematical Models; Numerical Analysis

20070005452 Mitre Corp., Bedford, MA USA

Algorithms using Java for Spreadsheet Dependent Cell Recomputation

Francoeur, Joe; Dec 3, 2002; 24 pp.; In English

Contract(s)/Grant(s): DAAB07-01-C-C201

Report No.(s): AD-A460168; No Copyright; Avail.: CASI: A03, Hardcopy

Java implementations of algorithms used by spreadsheets to antomatically recompute the set of cells dependent on a changed cell are described using a mathematical model for spreadsheets based on graph theory. Theses solutions comprise part of a Java API that allows a client application to read, modify, and maintain spreadsheet data without using the spreadsheet application program that produced it. Features of the Java language that successfully improve the running time performance of the algorithms are also described.

DTIC

Algorithms; Computation; Spreadsheets

20070005502 SRI International Corp., Menlo Park, CA USA

Microphone-Independent Robust Signal Processing Using Probabilistic Optimum Filtering

Neumeyer, Leonardo; Weintraub, Mitchel; Jan 1994; 7 pp.; In English

Contract(s)/Grant(s): NSF-IRI-9014829; N00014-93-C-0142

Report No.(s): AD-A460335; No Copyright; Avail.: CASI: A02, Hardcopy

A new mapping algorithm for speech recognition relates the features of simultaneous recordings of clean and noisy speech. The model is a piecewise nonlinear transformation applied to the noisy speech feature. The transformation is a set of multidimensional linear least-squares filters whose outputs are combined using a conditional Gaussian model. The algorithm was tested using SRI's DECIPHER(Trademark) speech recognition system. Experimental results show how the mapping is used to reduce recognition errors when the training and testing acoustic environments do not match.

DTIC

Acoustics; Algorithms; Microphones; Signal Processing; Speech; Speech Recognition

20070005522 BBN Systems and Technologies Corp., Cambridge, MA USA

Is N-Best Dead?

Nguyen, Long; Schwartz, Richard; Zhao, Ying; Zavaliagkos, George; Jan 1994; 5 pp.; In English

Contract(s)/Grant(s): N00014-92-C-0035

Report No.(s): AD-A460381; No Copyright; Avail.: CASI: A01, Hardcopy

We developed a faster search algorithm that avoids the use of the N-Best paradigm until after more powerful knowledge sources have been used. We found, however, that there was little or no decrease in word errors. We then showed that the use of the N-Best paradigm is still essential for the use of still more powerful knowledge sources, and for several other purposes that are outlined in the paper.

DTIC

Algorithms; Speech Recognition

65
STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; time series analysis; and stochastic processes.

20070003520 Xerox Palo Alto Research Center, CA USA

Speed and Accuracy in Shallow and Deep Stochastic Parsing

Kaplan, Ronald M; Riezler, Stefan; King, Tracy H; Maxwell, III, John T; Vasserman, Alexander; Crouch, Richard; Jan 2004; 9 pp.; In English

Contract(s)/Grant(s): MDA904-03-C-0404

Report No.(s): AD-A458874; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA458874; Avail.: CASI: A02, Hardcopy

This paper reports some experiments that Compare the accuracy and performance of two stochastic parsing systems. The currently popular Collins parser is a shallow parser whose output contains more detailed semantically relevant information than other such parsers. The XLE parser is a deep-parsing system that couples a Lexical Functional Grammar to a log- linear disambiguation component and provides much richer representations theory. We measured the accuracy of both systems against a gold standard of the PARC 700 dependency bank, and also measured their processing times. We found the deep-parsing system to be more accurate than the Collins parser with only a slight reduction in parsing speed.

DTIC

Accuracy; Depth; Grammars; Parsing Algorithms; Stochastic Processes

20070003628 Washington Univ., Seattle, WA USA

Calibrated Probabilistic Forecasting Using Ensemble Model Output Statistics and Minimum CRPS Estimation

May 5, 2004; 36 pp.; In English

Contract(s)/Grant(s): N00014-01-10745

Report No.(s): AD-A459688; UW-STAT-TR-449; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Calibrating; Probability Theory; Statistical Analysis; Models

20070003777 Institut de Recherche en Informatique et Systemes Aleatoires, Rennes, France
Multi-Scale Autoregressive Processes
Jun 1989; 82 pp.; In English
Contract(s)/Grant(s): AFOSR-88-0032; ECS-8700903
Report No.(s): AD-A459596; LIDS-P-1880; No Copyright; Avail.: CASI: A05, Hardcopy

No abstract available

Autoregressive Processes; Statistical Analysis; Regression Analysis

20070003849 Technical Univ. of Istanbul, Turkey
Gappy Data: To Krig or Not To Krig
Gunes, Hasan; Sirisup, Sirod; Karniadakis, George E; May 2005; 31 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459195; 2005-17; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459195; Avail.: CASI: A03, Hardcopy

Data recovery and reconstruction methods for unsteady flow fields with spatio-temporal missing data are studied based on proper orthogonal decomposition (POD) and on Kriging interpolation. It is found that for sufficient temporal resolution, POD-based methods outperform Kriging interpolation. However, for insufficient temporal resolution, large spatial gappiness or for flow fields with black zones, Kriging interpolation is more effective. The comparison is performed based on randomly generated laminar and turbulent flow fields obtained from simulations of uniform flow past a circular cylinder.
DTIC

Interpolation; Kriging; Flow Distribution

20070003885 Purdue Univ., West Lafayette, IN USA
Adaptive Bayesian Signal Reconstruction with A Priori Model Implementation and Synthetic Examples for X-Ray Crystallography
Feb 26, 1991; 38 pp.; In English
Contract(s)/Grant(s): AFOSR-89-0276
Report No.(s): AD-A459539; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Bayes Theorem; Crystallography; Signal Processing; X Rays; Mathematical Models

20070004682 Oak Ridge National Lab., TN USA
Statistical Methods and Software for the Analysis of Occupational Exposure Data with Non-Detectable Values
Frome, E. L.; Wambach, P. F.; Sep. 2005; 52 pp.; In English
Report No.(s): DE2006-885994; No Copyright; Avail.: Department of Energy Information Bridge

Environmental exposure measurements are, in general, positive and may be subject to left censoring; i.e,. the measured value is less than a detection limit. In occupational monitoring, strategies for assessing workplace exposures typically focus on the mean exposure level or the probability that any measurement exceeds a limit. Parametric methods used to determine acceptable levels of exposure, are often based on a two parameter lognormal distribution. The mean exposure level, an upper percentile, and the exceedance fraction are used to characterize exposure levels, and confidence limits are used to describe the uncertainty in these estimates. Statistical methods for random samples (without non-detects) from the lognormal distribution are well known for each of these situations. In this report, methods for estimating these quantities based on the maximum likelihood method for randomly left censored lognormal data are described and graphical methods are used to evaluate the lognormal assumption. If the lognormal model is in doubt and an alternative distribution for the exposure profile of a similar exposure group is not available, then nonparametric methods for left censored data are used.
NTIS

Computer Programs; Exposure; Statistical Analysis

20070004697 Sandia National Labs., Albuquerque, NM USA
Survey of Sampling-Based Methods for Uncertainty and Sensitivity Analysis
Helton, J. C.; Johnson, J. D.; Sallaberry, C. J.; Storlie, C. B.; Jun. 2006; 88 pp.; In English
Report No.(s): DE2006-886897; SAND2006-2901; No Copyright; Avail.: Department of Energy Information Bridge

Sampling-based methods for uncertainty and sensitivity analysis are reviewed. The following topics are considered: (1) Definition of probability distributions to characterize epistemic uncertainty in analysis inputs, (2) Generation of samples from

uncertain analysis inputs, (3) Propagation of sampled inputs through an analysis, (4) Presentation of uncertainty analysis results, and (5) Determination of sensitivity analysis results. Special attention is given to the determination of sensitivity analysis results, with brief descriptions and illustrations given for the following procedures/techniques: examination of scatterplots, correlation analysis, regression analysis, partial correlation analysis, rank transformations, statistical tests for patterns based on gridding, entropy tests for patterns based on gridding, nonparametric regression analysis, squared rank differences/rank correlation coefficient test, two dimensional Kolmogorov-Smirnov test, tests for patterns based on distance measures, top down coefficient of concordance, and variance decomposition.
NTIS
Sampling; Sensitivity Analysis; Surveys

20070004777 Massachusetts Inst. of Tech., Cambridge, MA USA
Multiscale Representations of Markov Random Fields
Luettgen, M R; Karl, W C; Willsky, A S; Tenney, R R; Sep 8, 1992; 60 pp.; In English
Contract(s)/Grant(s): AFOSR-92-J-0002; F49620-91-C-0047
Report No.(s): AD-A459389; LIDS-P-2130; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459389; Avail.: CASI: A04, Hardcopy

No abstract available
Markov Processes; Recursive Functions; Wavelet Analysis

20070004794 Massachusetts Inst. of Tech., Cambridge, MA USA
Can One Decide the Type of the Mean from the Empirical Measure?
Apr 1990; 7 pp.; In English
Contract(s)/Grant(s): DAAL03-86-K-0171
Report No.(s): AD-A459509; LIDS-P-1965; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available
Statistical Analysis; Mean; Statistical Decision Theory; Probability Theory

20070004820 Massachusetts Inst. of Tech., Cambridge, MA USA
Estimation and Detection with Chaotic Systems
Feb 1994; 215 pp.; In English
Contract(s)/Grant(s): F49620-92-J-0255; AFOSR-91-0034-C
Report No.(s): AD-A459508; RLE-TR-581; No Copyright; Avail.: CASI: A10, Hardcopy

No abstract available
Detection; Chaos; Algorithms; Systems Analysis

20070004865 Massachusetts Inst. of Tech., Cambridge, MA USA
Markov Random Fields, Stochastic Quantization and Image Analysis
Jan 1990; 13 pp.; In English
Contract(s)/Grant(s): AFOSR-89-0276
Report No.(s): AD-A459566; LIDS-P-2013; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Image Analysis; Stochastic Processes; Measurement

20070004881 NASA Langley Research Center, Hampton, VA, USA
Statistical Analysis of CFD Solutions from the Third AIAA Drag Prediction Workshop
Morrison, Joseph H.; Hemsch, Michael J.; 2007; 21 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 732759
Report No.(s): AIAA Paper 2007-0254; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004881; Avail.: CASI: A03, Hardcopy

The first AIAA Drag Prediction Workshop, held in June 2001, evaluated the results from an extensive N-version test of a collection of Reynolds-Averaged Navier-Stokes CFD codes. The code-to-code scatter was more than an order of magnitude larger than desired for design and experimental validation of cruise conditions for a subsonic transport configuration. The

second AIAA Drag Prediction Workshop, held in June 2003, emphasized the determination of installed pylon-nacelle drag increments and grid refinement studies. The code-to-code scatter was significantly reduced compared to the first DPW, but still larger than desired. However, grid refinement studies showed no significant improvement in code-to-code scatter with increasing grid refinement. The third Drag Prediction Workshop focused on the determination of installed side-of-body fairing drag increments and grid refinement studies for clean attached flow on wing alone configurations and for separated flow on the DLR-F6 subsonic transport model. This work evaluated the effect of grid refinement on the code-to-code scatter for the clean attached flow test cases and the separated flow test cases.
Author
Statistical Analysis; Computational Fluid Dynamics; Drag; Separated Flow; Navier-Stokes Equation; Aerodynamic Configurations; Subsonic Speed

20070005189 Johns Hopkins Univ., Baltimore, MD USA
Cross-Lingual Lexical Triggers in Statistical Language Modeling
Kim, Woosung; Khudanpur, Sanjeev; Jan 2003; 9 pp.; In English
Contract(s)/Grant(s): NSF-ITR-0225656; NSF-IIS-9982329
Report No.(s): AD-A459581; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459581; Avail.: CASI: A02, Hardcopy

We propose new methods to take advantage of text in resource-rich languages to sharpen statistical language models in resource-deficient languages. We achieve this through an extension of the method of lexical triggers to the cross-language problem, and by developing a likelihoodbased adaptation scheme for combining a trigger model with an N-gram model. We describe the application of such language models for automatic speech recognition. By exploiting a side-corpus of contemporaneous English news articles for adapting a static Chinese language model to transcribe Mandarin news stories, we demonstrate significant reductions in both perplexity and recognition errors. We also compare our cross-lingual adaptation scheme to monolingual language model adaptation, and to an alternate method for exploiting cross-lingual cues, via crosslingual information retrieval and machine translation, proposed elsewhere.
DTIC
Actuators; Mathematical Models; Statistical Analysis

20070005204 George Washington Univ., Washington, DC USA
HYDRA: A Java Library for Markov Chain Monte Carlo
Warnes, Gregory R; Mar 2002; 33 pp.; In English
Contract(s)/Grant(s): N00014-96-1-0192; NIH-1PO1CA76466
Report No.(s): AD-A459649; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459649; Avail.: Defense Technical Information Center (DTIC)

Hydra is an open-source, platform-neutral library for performing Markov Chain Monte Carlo. It implements the logic of standard MCMC samplers within a framework designed to be easy to use, extend, and integrate with other software tools. In this paper, we describe the problem that motivated our work, outline our goals for the Hydra project, and describe the current features of the Hydra library. We then provide a step-by-step example of using Hydra to simulate from a mixture model drawn from cancer genetics, first using a variable-at-a-time Metropolis sampler and then a Normal Kernel Coupler. We conclude with a discussion of future directions for Hydra.
DTIC
Libraries; Markov Chains; Markov Processes; Monte Carlo Method

20070005223 Washington Univ., Seattle, WA USA
Model Validation and Spatial Interpolation by Combining Observations with Outputs from Numerical Models via Bayesian Melding
Fuentes, Montserrat; Raftery, Adrian E; Nov 8, 2001; 33 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-1-96-1092; N00014-01-1-0745
Report No.(s): AD-A459748; TR-408; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459748; Avail.: CASI: A03, Hardcopy

Constructing maps of pollution levels is vital for air quality management, and presents statistical problems typical of many environmental and spatial applications. Ideally, such maps would be based on a dense network of monitoring stations, but this does not exist. Instead, there are two main sources of information in the U.S.: one is pollution measurements at a sparse set

of about 50 monitoring stations called CASTNet, and the other is pollution emissions data. The pollution emissions data do not give direct information about pollution levels, but instead are combined with numerical models of weather and the emissions process and information about land use and cover (collectively called Models-3), to produce maps. Here we develop a formal method for combining these two sources of information. We specify a simple model for both the Models-3 output and the CASTNet observations in terms of the unobserved ground truth, and estimate the model in a Bayesian way. This yields solutions to the spatial prediction, model validation and bias removal problems simultaneously. It provides improved spatial prediction via the posterior distribution of the ground truth, allows us to validate Models-3 via the posterior predictive distribution of the CASTNet observations, and enables us to remove the bias in the Models-3 output by estimating additive and multiplicative bias parameters in the model. We apply our methods to data on SO2 concentrations.
DTIC
Air Pollution; Bayes Theorem; Inference; Interpolation; Mathematical Models; Pollution Monitoring

20070005227 Washington Univ., Seattle, WA USA
Easy Computation of Bayes Factors and Normalizing Constants for Mixture Models via Mixture Importance Sampling
Emond, Mary J; Raftery, Adrian E; Steele, Russell J; Jul 1, 2001; 38 pp.; In English
Contract(s)/Grant(s): N00014-96-1-0192; N00014-96-1-0330
Report No.(s): AD-A459760; TR-398; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459760; Avail.: CASI: A03, Hardcopy

No abstract available

Bayes Theorem; Sampling

20070005229 Washington Univ., Seattle, WA USA
Determining the Number of Colors or Gray Levels in an Image Using Approximate Bayes Factors: The Pseudolikelihood Information Criterion (PLIC)
Stanford, Derek C; Raftery, Adrian E; Feb 15, 2001; 26 pp.; In English
Contract(s)/Grant(s): N00014-96-1-0192; N00014-96-1-0330
Report No.(s): AD-A459788; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459788; Avail.: CASI: A03, Hardcopy

We propose a method for choosing the number of colors., or true gray levels, in an image. This is motivated by medical and satellite image segmentation, and may also be useful for color and gray scale image quantization, the display and storage of computer-generated holograms, and the use of cooccurrence matrices for assessing texture in images. Our underlying probability model is a hidden Markov random field. Each number of colors considered is viewed as corresponding to a statistical model for the image, and the resulting models are compared via approximate Bayes factors. The Bayes factors are approximated using BIC, where the required maximized likelihood is approximated by the Qian-Titterington pseudolikelihood. We call the resulting criterion PLIC (Pseudolikelihood Information Criterion). We also discuss a simpler approximation, MMIC (Margiual Mixture Information Criterion), which is based only on the marginal distribution of pixel values. This turns out to be useful for initialization, and also to have moderately good, albeit suboptimal, performance in its own right. We apply PLIC to three examples: a simulated two-band image, a medical segmentation problem, and a satellite image, and in each case it gives good results in practice.
DTIC
Bayes Theorem; Color; Criteria; Images

20070005231 Washington Univ., Seattle, WA USA
Robust Estimation of cDNA Microarray Intensities with Replicates
Gottardo, Raphael; Raftery, Adrian E; Yeung, Ka Yee; Bumgarner, Roger E; Dec 1, 2003; 28 pp.; In English
Contract(s)/Grant(s): N00014-01-1-0745
Report No.(s): AD-A459797; TR-438; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459797; Avail.: CASI: A03, Hardcopy

No abstract available

Bayes Theorem; Complementary DNA; Markov Processes

20070005243 Washington Univ., Seattle, WA USA
Bilinear Mixed Effects Models for Dyadic Data
Hoff, Peter D; Jul 2, 2003; 21 pp.; In English
Contract(s)/Grant(s): N00014-02-1-1011

Report No.(s): AD-A459832; UW-STAT-TR-403; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459832; Avail.: CASI: A03, Hardcopy

This article discusses the use of a symmetric multiplicative interaction effect to capture certain types of third-order dependence patterns often present in social networks and other dyadic datasets. Such an effect, along with standard linear fixed and random effects, is incorporated into a generalized linear model, and a Markov chain Monte Carlo algorithm is provided for Bayesian estimation and inference. In an example analysis of international relations data, accounting for such patterns improves model fit and predictive performance.

DTIC

Algorithms; Markov Chains; Mathematical Models; Monte Carlo Method

20070005246 Washington Univ., Seattle, WA USA

Easy Estimation of Normalizing Constants and Bayes Factors from Posterior Simulation: Stabilizing the Harmonic Mean Estimator

Satagopan, Jaya M; Newton, Michael A; Raftery, Adrian E; Nov 2000; 23 pp.; In English

Contract(s)/Grant(s): N00014-96-1-1092

Report No.(s): AD-A459836; TR-382; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459836; Avail.: CASI: A03, Hardcopy

No abstract available

Bayes Theorem; Stabilization

20070005248 Massachusetts Inst. of Tech., Cambridge, MA USA

Bagging Regularizes

Poggio, Tomaso; Rifkin, Ryan; Mukherjee, Sayan; Rakhlin, Alex; Mar 2002; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-00-1-0907; IIS-0085836

Report No.(s): AD-A459843; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459843; Avail.: CASI: A02, Hardcopy

Intuitively, we expect that averaging - or bagging - different regressors with low correlation should smooth their behavior and be somewhat similar to regularization. In this note we make this intuition precise. Using an almost classical definition of stability, we prove that a certain form of averaging provides generalization bounds with a rate of convergence of the same order as Tikhonov regularization - similar to fashionable RKHS-based learning algorithms,

DTIC

Expert Systems; Regression Analysis; Stability

20070005251 Baker (Wilfred) Engineering, Inc., San Antonio, TX USA

Risk Bounds for Mixture Density Estimation

Rakhlin, Alexander; Panchenko, Dmitry; Mukherjee, Sayan; Jan 2004; 13 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-00-1-0907; N00014-02-1-0915

Report No.(s): AD-A459846; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459846; Avail.: CASI: A03, Hardcopy

In this paper we focus on the problem of estimating a bounded density using a finite combination of densities from a given class. We consider the Maximum Likelihood Procedure (MLE) and the greedy procedure described by Li and Barron. Approximation and estimation bounds are given for the above methods. We extend and improve upon the estimation results of Li and Barron, and in particular prove a bound on the estimation error which does not depend on the number of densities in the estimated combination.

DTIC

Maximum Likelihood Estimates; Risk

20070005320 Naval Research Lab., Washington, DC USA

Intensity Analysis of Recurrence Plots for the Detection of Deterministic Signals in Noise

Dissinger, Bryan M; Nichols, J M; Rohde, G K; Rhodes, R B; Bucholtz, F; Dec 12, 2006; 28 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459965; NRL/MR/5650--06-9004; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459965; Avail.: CASI: A03, Hardcopy

This report describes a new method for the detection of deterministic signals in the presence of additive white Gaussian noise. The new method, based on recurrence plots, relies on a sliding-window technique combined with histogram analysis. Performance of the new approach is quantified in terms of receiver-operator characteristic (ROC) curves. The report also provides background information on recurrence plots and ROC curves necessary to understand the new approach.

DTIC

Signal Detection

20070005322 Massachusetts Inst. of Tech., Cambridge, MA USA

Multiscale Representations of Markov Random Fields

Luettgen, Mark R; Karl, William C; Willsky, Alan S; Tenney, Robert R; Jun 27, 1993; 40 pp.; In English

Contract(s)/Grant(s): N00014-91-J-1004

Report No.(s): AD-A459967; MIT-LIDS-P-2157; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459967; Avail.: CASI: A03, Hardcopy

Recently, a framework for multiscale stochastic modeling was introduced based on coarse-to-fine scale-recursive dynamics defined on trees. This model class has some attractive characteristics which lead to extremely efficient, statistically optimal signal and image processing algorithms. In this paper, we show that this model class is also quite rich. In particular, we describe how 1-D Markov processes and 2-D Markov random fields (MRF's) can be represented within this framework. The recursive structure of 1-D Markov processes makes them simple to analyze, and generally leads to computationally efficient algorithms for statistical inference. On the other hand, 2-D MRF's are well known to be very difficult to analyze due to their non-causal structure, and thus their use typically leads to computationally intensive algorithms for smoothing and parameter identification. In contrast, our multiscale representations are based on scale-recursive models and thus lead naturally to scale-recursive algorithms, which can be substantially more efficient computationally than those associated with MRF models. In 1-D, the multiscale representation is a generalization of the mid-point deflection construction of Brownian motion. The representation of 2-D MRF's is based on a further generalization to a 'mid-line' deflection construction. The exact representations of 2-D MRF's are used to motivate a class of multiscale approximate MRF models based on one-dimensional wavelet transforms. We demonstrate the use of these latter models in the context of texture representation and, in particular, we show how they can be used as approximations for or alternatives to well-known MRF texture models.

DTIC

Inference; Markov Processes; Radio Frequencies

20070005327 Army Tank-Automotive and Armaments Command, Warren, MI USA

Survivability: A Markov Process

Parks, Jack G; Apr 1, 2001; 7 pp.; In English

Report No.(s): AD-A459974; 16199; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459974; Avail.: CASI: A02, Hardcopy

Previous articles In this series have covered the time behavior of force strengths, battle trajectories, and recursive relationships between battle parameters. In this edition, the general solution to the Markov equation is derived and effects of segmented battle are compared with traditional conflict modes. Survivability, lethality, and repair are compared as command options. New graphic techniques are explored to reveal fundamental features of this combat structure.

DTIC

Lethality; Markov Processes; Segments

20070005353 Carnegie-Mellon Univ., Pittsburgh, PA USA

A Network Optimization Approach for Improving Organizational Design

Carley, Kathleen M; Kamneva, Natalia Y; Jan 2004; 25 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-02-1-0973; N00014-97-1-0037

Report No.(s): AD-A460030; CMU-ISRI-04-102; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460030; Avail.: CASI: A03, Hardcopy

Organizations are frequently designed and redesigned, often in efforts to improve performance or meet various managerial goals for coordination and communication. Such design is often done through the review of a few of options and the use of managerial and possibly personnel insight into how the new design might work. In contrast, we provide a systematic

optimization based approach. In this approach, the user can pick one or more Dynamic Network Analysis (DNA) metrics and then use one or more of the available optimizers to find a design that more closely meets this ideal. The optimizer utilizes heuristic based optimization procedures to generate an optimized organizational design given a particular mission. DNA metrics, such as Communication Congruence, Resource Congruence, Cognitive Load, and Actual Workload, serve to define criteria. The Optimizer can perform multi-criteria optimization in order to improve several metrics simultaneously. Two optimization methods can be used Monte Carlo and Simulated Annealing, both of which are statistical methods of finding a global optimum. DNA metrics used in the optimizations are computed by ORA. This report describes this optimizer.
DTIC
Network Analysis; Optimization; Organizations; Workloads (Psychophysiology)

20070005406 Army Tank-Automotive and Armaments Command, Warren, MI USA
Techniques for the Statistical Analysis of Observer Data
Bennett, John G; Feb 14, 2001; 6 pp.; In English
Report No.(s): AD-A460096; No Copyright; Avail.: CASI: A02, Hardcopy

For vehicle designers, the main goal of experiments on the observability of combat vehicles is a comparison of the probability of detection of two vehicles as a function of range. This paper investigates two statistical techniques for analyzing data from fixed observer tests. The two techniques are as follows: (1) fitting logistic curves to the vehicle data, and (2) using the Fisher Exact Test to compare the probability of detection of the two vehicles at each range. The paper also discusses the issues of background variability and confidence levels for hypothesis testing. Results show that the Fisher Exact Test has advantages over fitting a logistic curve. Because data are compared only at the same range, the effect of variability of background with range is avoided. Experimental sample sizes can be calculated for comparison of proportions to insure that a given difference in probability of detection (Pd) will be significant. Moreover, the Fisher Exact Test lends itself to quantitative hypothesis testing.
DTIC
Combat; Curve Fitting; Detection; Field Tests; Statistical Analysis

20070005439 Polytechnic Univ., Brooklyn, NY USA
Enhancement of Stochastic Resonance by Tuning System Parameters and Adding Noise Simultaneously
Wu, Xingxing; Jiang, Zhong-Ping; Repperger, Daniel; Nov 2005; 8 pp.; In English
Contract(s)/Grant(s): Proj-2313
Report No.(s): AD-A460145; No Copyright; Avail.: CASI: A02, Hardcopy

The stochastic resonance effect can be realized by tuning system parameters or by adding noise. This paper investigates the possibility to enhance the stochastic resonance effect by tuning system parameters and adding noise simultaneously. First, we use some examples to demonstrate the situation where only the system parameters or noise can be adjusted for maximizing the stochastic resonance effect. Then, it is shown using standard optimization theory that the normalized power normal \hC\g of the bistable double-well system with a periodic input signal can reach a larger maximal value by tuning the system parameter and adding noise simultaneously. Finally, for the purpose of practical implementation, searching for the optimal system parameter and noise intensity is realized by an on-line fast-converging optimization algorithm.
DTIC
Augmentation; Resonance; Stochastic Processes; Tuning

20070005445 Massachusetts Inst. of Tech., Cambridge, MA USA
Simulated Annealing Type Algorithms for Multivariate Optimization
Gelfand, Saul B; Mitter, Sanjoy K; Jan 1989; 23 pp.; In English
Contract(s)/Grant(s): AFOSR-85-0227B
Report No.(s): AD-A460156; LIDS-P-1845; No Copyright; Avail.: CASI: A03, Hardcopy

We study the convergence of a class of discrete-time continuous-state stimulated annealing type algorithms for multivariate optimization. The general algorithm that we consider is of the form Xk+1= Xk - a(k)(delU(Xk) + xik) + bkWk. Here U(.) is a smooth function on a compact subset of real number r, {xik} is a sequence of real number r - valued random variables, {Wk} is a sequence of independent standard r-dimensional Gaussian random variables, and {ak}, {bk} are sequences of positive numbers which tend to zero. These algorithms arise by adding slowly decreasing white Gaussian noise to gradient descent, random search, and stochastic approximation algorithms. We show that under suitable conditions on U(.),

{xik}, {ak} and {bk} that Xk converges in probability to the set of global minima of U(.).
DTIC
Algorithms; Multivariate Statistical Analysis; Optimization; Simulated Annealing; Stochastic Processes

20070005514 Polytechnic Univ., Brooklyn, NY USA
Enhancement of Stochastic Resonance Using Optimization Theory
Wu, Xingxing; Jiang, Zhong-Ping; Repperger, Daniel W; Guo, Yi; Sep 2006; 22 pp.; In English
Contract(s)/Grant(s): ECS-009317; OISE-0408925; Proj-2313
Report No.(s): AD-A460357; No Copyright; Avail.: CASI: A03, Hardcopy

The traditional stochastic resonance is realized by adding an optimal amount of noise, while the parameter tuning stochastic resonance is realized by optimally tuning the system parameters. The further improvement of the maximal normalized power norm of the bistable double-well dynamic system with white Gaussian noise input can be converted to an optimization problem with constraints on system parameters and noise intensity, which is proven to have one and only one local maximum for the Gaussian-distributed weak input signal.
DTIC
Augmentation; Optimization; Random Noise; Signal to Noise Ratios; Stochastic Processes

20070005519 SRI International Corp., Menlo Park, CA USA
Stereo Matching by Hierarchical, Microcanonical Annealing
Barnard, Stephen T; Feb 6, 1987; 16 pp.; In English
Contract(s)/Grant(s): DCA76-85-C-0004; MDA903-86-C-0084
Report No.(s): AD-A460372; TN-414; No Copyright; Avail.: CASI: A03, Hardcopy

An improved stochastic stereo-matching algorithm is presented. It incorporates two substantial modifications to an earlier version: a new variation of simulated annealing that is faster, simpler, and more controllable than the conventional 'heat-bath' version, and a hierarchical, coarse-to- fine-resolution control structure. The Hamiltonian used in the original model is minimized, but far more efficiently. The basis of micro canonical annealing is the Creutz algorithm. Unlike its counterpart, the familiar Metropolis algorithm, the Creutz algorithm simulates a thermally isolated system at equilibrium. The hierarchical control structure, together with a Brownian state-transition function, tracks ground states across scale, beginning with small, coarsely coded levels. Results are shown for a 512 x 512 pair with 50 pixels of disparity.
DTIC
Algorithms; Annealing; Stochastic Processes

66
SYSTEMS ANALYSIS AND OPERATIONS RESEARCH

Includes mathematical modeling of systems; network analysis; mathematical programming; decision theory; and game theory.

20070003831 University of Southern California, Marina del Rey, CA USA
Mitigation Theory: An Integrated Approach
Martinovski, Bilyana; Mao, Wenji; Gratch, Jonathan; Marsella, Stacy; Jan 2005; 7 pp.; In English
Report No.(s): AD-A459212; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459212; Avail.: CASI: A02, Hardcopy

The purpose of this paper is to develop a theoretical model of mitigation by integrating cognitive and discourse approaches to appraisal and coping. Mitigation involves strategic, emotional, linguistic, and Theory of Mind processes on different levels of consciousness. We emphasize that discourse analysis can assist our understanding of these processes.
DTIC
Social Factors; Mathematical Models; Psychology

20070003833 Texas Univ., Arlington, TX USA
Iterative Structure Discovery in Graph-Based Data
Coble, Jeffrey A; Rathi, Runu; Cook, Diane J; Holder, Lawrence B; Jan 2005; 25 pp.; In English
Contract(s)/Grant(s): F30602-01-2-0570
Report No.(s): AD-A459054; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459054; Avail.: CASI: A03, 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 or relationally structured. In this paper we present approaches to address two related challenges; the need to assimilate incremental data updates and the need to mine monolithic datasets. Many realistic problems are continuous in nature and therefore require a data mining approach that can evolve discovered knowledge over time. Similarly, many problems present data sets that are too large to fit into dynamic memory on conventional computer systems. We address incremental data mining by introducing a mechanism for summarizing discoveries from previous data increments so that the globally-best patterns can be computed by mining only the new data increment. To address monolithic datasets we introduce a technique by which these datasets can be partitioned and mined serially with minimal impact on the result quality. We present applications of our work in both the counter-terrorism and bioinformatics domains.
DTIC
Information Retrieval; Iteration; Graphs (Charts); Data Mining

20070004635 Aerospace Corp., USA
Constellation Stretch Goals: Review of Industry Inputs
Lang, John; December 19, 2006; 148 pp.; In English; Constellation Stretch Goals, 19- Dec. 2006, Washington, DC, USA; Original contains color illustrations
Contract(s)/Grant(s): NNL04AA09B; WBS 604746.01.98.04; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004635; Avail.: CASI: A07, Hardcopy

Many good ideas received based on industry experience: a) Shuttle operations; b) Commercial aircraft production; c) NASA's historical way of doing business; d) Military and commercial programs. Aerospace performed preliminary analysis: a) Potential savings; b) Cost of implementation; c) Performance or other impact/penalties; d) Roadblocks; e) Unintended consequences; f) Bottom line. Significant work ahead for a 'Stretch Goal'to become a good, documented requirement: 1) As a group, the relative 'value' of goals are uneven; 2) Focused analysis on each goal is required: a) Need to ensure that a new requirement produces the desired consequence; b) It is not certain that some goals will not create problems elsewhere. 3) Individual implementation path needs to be studied: a) Best place to insert requirement (what level, which document); b) Appropriate wording for the requirement. Many goals reflect 'best practices' based on lessons learned and may have value beyond near-term CxP requirements process.
Derived from text
Industries; Commerce; Commercial Aircraft; Costs; Military Operations; Space Transportation System Flights

20070004817 Massachusetts Inst. of Tech., Cambridge, MA USA
Analysis, Estimation, and Control for Perturbed and Singular Systems and for Systems Subject to Discrete Events
Oct 1988; 25 pp.; In English
Contract(s)/Grant(s): AFOSR-88-0032
Report No.(s): AD-A459505; LIDS-R-1826; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Linear Systems; Systems Analysis; Perturbation; Asymptotes; Control Systems Design

20070004925 Massachusetts Inst. of Tech., Cambridge, MA USA
Analytical Verification of Undesirable Properties of Direct Model Reference Adaptive Control Algorithms
Aug 1981; 65 pp.; In English
Contract(s)/Grant(s): AFOSR-77-3281
Report No.(s): AD-A459574; LIDS-P-1122; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available
Algorithms; Model Reference Adaptive Control; Mathematical Models; Feedback Control

20070005185 Military Academy, West Point, NY USA
Risk-Based Decision Support of Water Resource Management Alternatives
West, Paul D; Trainor, Timothy E; Dec 2006; 28 pp.; In English
Report No.(s): AD-A458328; DSE-TR-0721; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA458328; Avail.: CASI: A03, Hardcopy

This report describes a risk-based decision support system for designing and managing large-scale water resource projects. A model is presented that combines a new risk assessment methodology with traditional decision-making tools to enable systems engineers to capture the full spectrum of operational risks during the design process. Enhancing public welfare through the deliberate management of water resources is vital for every society. Pollution, overuse, and consumption challenge a society's ability to develop and sustain water supplies for municipal, agricultural, industrial, and recreational use while protecting fisheries and wetlands. Water resource management decisions are complex and involve risk. This project identifies a risk taxonomy to help managers identify those risks and their severity. These risk factors provide the foundation for a multi-attribute utility decision support tool for managers and policymakers. Quantifying the risks in competing courses of action is an essential first step. The risk taxonomy identifies 13 risk factors that comprise the physical, logical, and environmental domains. Attributes of the essential risk elements are viewed in terms of utility and drive the decision process through traditional multi-attribute utility analysis. The result is a set of feasible alternatives that is both risk-based and value-focused for the decision maker to consider. The project is presented in the context of the Susquehanna River Basin that spans three states in the USA, with management interests at the state, regional, and national levels. The Susquehanna River is the 16th largest river in the USA and its tributaries drain 27,510 square miles. The project builds on work supporting the Susquehanna River Basin Commission's decision on managing the 14-mile-long Conowingo Pool near the river's terminus. This project was conducted for the NATO Advanced Research Workshop held in Istanbul, Turkey, 12-16 Oct 2006.
DTIC

Alternatives; Decision Support Systems; Resources Management; Risk; Rivers; Susquehanna River Basin (MD-NY-PA); Taxonomy; Water Resources

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20070005186 Massachusetts Inst. of Tech., Cambridge, MA USA

On the Design of Information-Processing and Decisionmaking Organizations

Boettcher, Kevin L; Levis, Alexander H; Sep 1982; 20 pp.; In English
Contract(s)/Grant(s): AFOSR-80-0229
Report No.(s): AD-A459577; LIDS-P-1241; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459577; Avail.: CASI: A03, Hardcopy

An effectiveness measure for comparing alternative organizational structures is derived and then applied to the evaluation of two three-person organizations. The modeling and analysis of the organizations is carried out using an information theoretic framework in which decisionmakers are described by a two-stage model consisting of a situation assessment and a response selection stage. The total rate of internal processing of each decisionmaker is constrained by bounded rationality, while the performance of the organization must satisfy specified goals. The interrelationship between performance and bounded rationality is expressed in a generalized strategy space that forms the basis for the effectiveness analysis.
DTIC

Data Processing; Decision Making; Mathematical Models; Organizations

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20070005191 Massachusetts Inst. of Tech., Cambridge, MA USA

Modeling the Interacting Decision Maker with Bounded Rationality

Boettcher, Kevin L; Levis, Alexander H; Jul 1981; 34 pp.; In English
Contract(s)/Grant(s): AFOSR-80-0229
Report No.(s): AD-A459583; LIDS-P-1110; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459583; Avail.: CASI: A03, Hardcopy

An analytic characterization of the process of executing a well-defined decision-making task by a human decision maker is presented. A basic two-stage model of this process is introduced in which external situations are first assessed and then responses are selected. An information theoretic framework is used in which total internal activity is described in terms of internal coordination and internal decision-making, as well as throughput and blockage. A constraint on the rate of internal processing is suggested as a model of bounded rationality. The model is extended to include basic interactions in an organizational context: Direct control is modeled as a restriction on internal decision-making by external commands while indirect control is incorporated through an auxiliary situation assessment input received from the organization.
DTIC

Decision Making; Decision Theory

20070005297 Army Tank-Automotive Research and Development Command, Warren, MI USA

A Comparison of Mamdani and Sugeno Methods for Modeling Visual Perception Lab Data

Meitzler, Thomas J; Sohn, Euijung; Jun 1, 2005; 6 pp.; In English

Report No.(s): AD-A459918; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459918; Avail.: CASI: A02, Hardcopy

A laboratory test procedure is described by the authors in which a baseline Light Armored Vehicle (LAV) is compared to a treated LAV in the TARDEC Visual Perception Laboratory (VPL). The test imagery was collected from the field and then adjusted for display in the laboratory. The experimental visual detection values obtained in the lab were modeled using the Mamdani and Sugeno/ANFIS Fuzzy Reasoning techniques. The results of each modeling approach are compared to the experimental detection values obtained in the laboratory.

DTIC

Detection; Fuzzy Systems; Military Vehicles; Visual Perception

20070005360 Brigham Young Univ., Provo, UT USA

Characteristic Shape Sequences for Measures on Images

Pinge, Rachael L; Abramson, Mark A; Asaki, Thomas J; Dennis, J E; Nov 22, 2006; 17 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-01-1-0013

Report No.(s): AD-A460043; TR06-17; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460043; Avail.: CASI: A03, Hardcopy

Researchers in many fields often need to quantify the similarity between images using metrics that measure qualities of interest in a robust quantitative manner. We present here the concept of image dimension reduction through characteristic shape sequences. We formulate the problem as a nonlinear optimization program and demonstrate the solution on a test problem of extracting maximal area ellipses from two dimensional image data. To solve the problem numerically, we augment the class of mesh adaptive direct search (MADS) algorithms with a filter, so as to allow infeasible starting points and to achieve better local solutions. Results here show that the MADS filter algorithm is successful in the test problem of finding good characteristic ellipse solutions from simple but noisy images.

DTIC

Optimization; Sequencing; Shapes

20070005364 Massachusetts Inst. of Tech., Cambridge, MA USA

Robust Controller Design: Minimizing Peak-to-Peak Gain

Dahleh, Munther A; Sep 1992; 98 pp.; In English

Contract(s)/Grant(s): F33615-90-C-3608

Report No.(s): AD-A460049; LIDS-P-2129; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460049; Avail.: CASI: A05, Hardcopy

In this report, we address the general problem of designing controllers that minimize the maximum peak-to-peak gain,otherwise known as the iota1 optimal control problem, in the presence of structured uncertainty.

DTIC

Controllers; Feedback

20070005376 Massachusetts Inst. of Tech., Cambridge, MA USA

Parallel Algorithms for the Assignment and Minimum-Cost Flow Problems

Orlin, James B; Stein, Clifford; Jul 1992; 11 pp.; In English

Contract(s)/Grant(s): AFOSR-88-0088

Report No.(s): AD-A460051; SLOAN-WP-3440-92-MSA; No Copyright; Avail.: CASI: A03, Hardcopy

Let G = (V, E) be a network for an assignment problem with 2n nodes and m edges, in which the largest edge cost is C. Recently the class of instances of bipartite matching problems has been shown to be in RNC provided that C is O(log(exp. k) n) for some fixed k. We show how to use scaling so as to develop an improved parallel algorithm and show that bipartite matching problems are in the class RNC provided that C = O(n (log(exp k) n)) for some fixed k. We then generalize these results to minimum-cost flow problems. Let U be an upper bound on the capacities of the edges and on the largest demand. We show that the minimum cost flow problem is in the class RNC, provided that log(C + U) = O(log(exp k) n) for some fixed k. Thus the minimum-cost flow problem is in the class RNC even when the magnitude of the costs and capacities are allowed

to grow faster than any polynomial in n. The key to our approach is to reduce the number of processors needed from an amount that is proportional to the magnitude of the largest edge cost to an amount that is independent of the magnitude of the largest edge cost. The tradeoff is an increase in the running time that grows linearly in log(C + U).
DTIC
Algorithms; Allocations; Cost Effectiveness

20070005503 Mitre Corp., Hampton, VA USA
XML-Native Constraint Evaluation
Cokus, M; Costello, R; Malloy, M A; Masek, E; Winkowski, D; Jan 2004; 25 pp.; In English
Report No.(s): AD-A460336; XC-AC2ISRC; No Copyright; Avail.: CASI: A03, Hardcopy

This paper discusses approaches to validating XML documents for compliance to constraints. Our particular focus is on structural and content constraints that go beyond what is readily expressible in XML Schema technologies. We provide examples and solutions drawn from our specific experience building an XML-native constraint validator based on a mathematical language called Structural Notation (SN). SN is used to express operational constraints as machine-processible Rules against a particular category of hierarchically structured, text-oriented military messages, called Message Text Formats (MTFs), which have been migrated to a corresponding XML-based representation. We discuss the challenges we faced in implementing this XML-native constraint evaluator. For example, we discuss how, to build a Rule validator, we found it necessary to extend the underpinnings of logical evaluation in XPath 2.0 to use three-valued logic (3VL) rather than two-valued logic. We detail some general principles for expressing and enforcing constraints against regularly structured text, when rendered as an XML document. We enumerate minimal capabilities needed by a constraint language and evaluator for XML documents and suggest some ways our approaches can be generalized for use in other domains. Because the need to apply constraints to incomplete or flawed documents is not unique to the military messaging world, a constraint evaluation model such as we propose, grounded in 3VL, is relevant to the XML user community at large.
DTIC
Document Markup Languages; Format; Messages; Texts

20070005520 Army Research Inst. of Environmental Medicine, Natick, MA USA
Preliminary Derivation of Test Item Clusters for Predicting Injuries, Poor Physical Performance, and Overall Attrition in Basic Combat Training
Allison, Stephen C; Knapik, Joseph J; Sharp, Marilyn A; Dec 2006; 59 pp.; In English
Report No.(s): AD-A460374; USARIEM-T07-06; No Copyright; Avail.: CASI: A04, Hardcopy

Analytic methods including test item clusters (TICs) employed in medical diagnostic testing have potential for estimating probabilities of negative military training outcomes in individual trainees. Baseline attributes and performance scores that discriminate between groups experiencing negative vs. positive training outcomes were combined to maximize predictive power and accuracy. Predictive models were derived from 15 baseline variables using existing data (518 men and 416 women Basic Combat Training (BCT) trainees) to predict: Army Physical Fitness Test (APFT) failure at week 7; overuse injury during BCT; and failure to complete BCT with peers. The models included from one to four predictors per TIC. Large shifts in pre-test to post-test probability (as high as from 16% pre-test probability to 90% post-test probability) were observed with TICs to predict APFT failure for both men and women, and to predict overuse injuries in men. Smaller probability shifts were seen with the single tests identified to predict BCT attrition for both men and women. No useful model for predicting overuse injuries in women was derived from the methods and data employed in this study. This study suggests good potential for these analytic methods to derive useful combinations of prognostic variable for predicting negative outcomes in BCT.
DTIC
Combat; Education; Injuries; Performance Prediction; Physical Fitness

20070005524 Maryland Univ., College Park, MD USA
Summarization-Inspired Temporal-Relation Extraction: Tense-Pair Templates and Treebank-3 Analysis
Dorr, Bonnie; Gaasterland, Terry; Dec 2006; 12 pp.; In English
Contract(s)/Grant(s): HR0011-06-2-0001
Report No.(s): AD-A460392; UMIACS-TR-2006-58; CS-TR-4844; No Copyright; Avail.: CASI: A03, Hardcopy

This document describes the information used for summarization-inspired temporal-relation extraction [Dorr and Gaasterland, 2007]. We present a set of tense/aspect extraction templates that are applied to a Penn Treebank-style analysis of the input sentence. We also present an analysis of tense-pair combinations for different temporal connectives based on a

corpus analysis of complex tense structures in Treebank-3. Finally, we include analysis charts and temporal relation tables for all combinations of intervals/points for each legal BTS combinations.
DTIC
Linguistics; Natural Language Processing; Templates

67
THEORETICAL MATHEMATICS

Includes algebra, functional analysis, geometry, topology, set theory, group theory and number theory.

20070003519 University of Southern California, Marina del Rey, CA USA
Evaluating a Computational Model of Social Causality and Responsibility
Mao, Wenji; Gratch, Jonathan; Jan 2006; 9 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459151; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459151; Avail.: CASI: A02, Hardcopy

Intelligent agents are typically situated in a social environment and must reason about social cause and effect. Such reasoning is qualitatively different from physical causal reasoning that underlies most intelligent systems. Modeling social causal reasoning can enrich the capabilities of multi-agent systems and intelligent user interfaces. In this paper, we empirically evaluate a computational model of social causality and responsibility against human social judgments. Results from our experimental studies show that in general, the model's predictions of internal variables and inference process are consistent with human responses, though they also suggest some possible refinement to the computational model.
DTIC
Artificial Intelligence; Bias; Cognition; Models

20070004561 Massachusetts Inst. of Tech., Cambridge, MA USA
On the Onsager-Machlup Functional of Diffusion Processes Around Non C2 Curves
Aug 1988; 31 pp.; In English
Contract(s)/Grant(s): AFOSR-85-0227
Report No.(s): AD-A459633; LIDS-P-1742; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Diffusion; Curves; Functionals

20070005206 Massachusetts Inst. of Tech., Cambridge, MA USA
Analysis of Continuous Switching Systems: Theory and Examples
Branicky, Michael S; Nov 1993; 29 pp.; In English
Contract(s)/Grant(s): F49620-86-C-0127; SBF861-0436
Report No.(s): AD-A459652; LIDS-P-2215; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459652; Avail.: CASI: A03, Hardcopy

This paper details work on ordinary differential equations that continuously switch among regimes of operation. In the first part, we develop some tools for analyzing such systems. We prove an extension of Bendixson's Theorem to the case of Lipschitz continuous vector fields. We also prove a lemma dealing with the robustness of differential equations with respect to perturbations that preserve a linear part, which we call the Linear Robustness Lemma. We then give some simple propositions that allow us to use this lemma in studying certain singular perturbation problems. In the second part, the attention focuses on example systems and their analysis. We use the tools from the first part and develop some general insights. The example systems arise from a realistic aircraft control problem. The extension of Bendixson's Theorem and the Linear Robustness Lemma have applicability beyond the systems discussed in this paper.
DTIC
Differential Equations; Digital Systems; Switching; Switching Theory

20070005230 Washington Univ., Seattle, WA USA
Incremental Model-Based Clustering for Large Datasets With Small Clusters
Fraley, Chris; Raftery, Adrian; Wehrensy, Ron; Dec 10, 2003; 24 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-01-10745
Report No.(s): AD-A459790; TR-439; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459790; Avail.: CASI: A03, Hardcopy

Clustering is often useful for analyzing and summarizing information within large datasets. Model-based clustering methods have been found to be effective for determining the number of clusters, dealing with outliers, and selecting the best clustering method in datasets that are small to moderate in size. For large datasets, current model-based clustering methods tend to be limited by memory and time requirements and the increasing difficulty of maximum likelihood estimation. They may fit too many clusters in some portions of the data and/or miss clusters containing relatively few observations. We propose an incremental approach for data that can be processed as a whole in memory, which is relatively efficient computationally and has the ability to and small clusters in large datasets. The method starts by drawing a random sample of the data, selecting and fitting a clustering model to the sample, and extending the model to the full dataset by additional EM iterations. New clusters are then added incrementally, initialized with the observations that are poorly fit by the current model. We demonstrate the effectiveness of this method by applying it to simulated data, and to image data where its performance can be assessed visually.
DTIC
Algorithms; Data Processing; Mathematical Models; Set Theory

20070005234 Massachusetts Inst. of Tech., Cambridge, MA USA
Dissociated Dipoles: Image Representation via Non-local Comparisons
Balas, Benjamin J; Sinha, Pawan; Aug 2003; 16 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459820; AL MEMO 2003-018; CBCL MEMO 229; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459820; Avail.: CASI: A03, Hardcopy

A fundamental question in visual neuroscience is how to represent image structure. The most common representational schemes rely on differential operators that compare adjacent image regions. While well-suited to encoding local relationships, such operators have significant drawbacks. Specifically, each filter's span is confounded with the size of its sub-fields, making it difficult to compare small regions across large distances. We find that such long-distance comparisons are more tolerant to common image transformations than purely local ones, suggesting they may provide a useful vocabulary for image encoding. . We introduce the Dissociated Dipole, or Sticks operator, for encoding non-local image relationships. This operator de-couples filter span from sub-field size, enabling parametric movement between edge and region-based representation modes. We report on the perceptual plausibility of the operator, and the computational advantages of non-local encoding. Our results suggest that non-local encoding may be an effective scheme for representing image structure.
DTIC
Differential Equations; Images

20070005239 Washington Univ., Seattle, WA USA
Strictly Proper Scoring Rules, Prediction and Estimation
Gneiting, Tilmann; Raftery, Adrian E; Sep 2004; 30 pp.; In English
Contract(s)/Grant(s): N00014-01-10745
Report No.(s): AD-A459827; UW-STAT-TR-463; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459827; Avail.: CASI: A03, Hardcopy

Scoring rules assess the quality of probabilistic forecasts, by assigning a numerical score based on the forecast and on the event or value that materializes. A scoring rule is strictly proper if the forecaster maximizes the expected score for an observation drawn from the distribution F if she issues the probabilistic forecast F, rather than any G not equal F. In prediction problems, strictly proper scoring rules encourage the forecaster to make careful assessments and to be honest. In estimation problems, strictly proper scoring rules provide attractive loss and utility functions that can be tailored to the scientific problem at hand. This paper characterizes strictly proper scoring rules on general probability spaces, and proposes and discusses examples of such. The continuous ranked probability score applies to probabilistic forecasts that take the form of predictive cumulative distribution functions; it generalizes the absolute error and forms a special case of a new and very general type of score, the energy score. Proper scoring rules for quantile and interval forecasts are also discussed. We relate proper scoring rules to Bayes factors and to cross-validation, and show that a particular form of cross-validation, random-fold cross-validated likelihood, corresponds to a proper scoring rule. This also allows us to define proper scoring rules when parameters defining the rule are estimated from the data. A case study on probabilistic weather forecasts in the North American Pacific Northwest illustrates the importance of strict propriety. Optimum score approaches to point estimation are noted, and the intuitively appealing interval score is proposed as a utility function in interval estimation that addresses width as well as coverage.
DTIC
Prediction Analysis Techniques; Scoring

20070005256 Massachusetts Inst. of Tech., Cambridge, MA USA

Statistical Learning: Stability is Sufficient for Generalization and Necessary and Sufficient for Consistency of Empirical Risk Minimization

Mukherjee, Sayan; Niyogi, Partha; Poggio, Tomaso; Rifkin, Ryan; Jan 2004; 56 pp.; In English

Contract(s)/Grant(s): N00014-00-1-0907

Report No.(s): AD-A459857; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459857; Avail.: CASI: A04, Hardcopy

Solutions of learning problems by Empirical Risk Minimization (ERM) -- and almost-ERM when the minimizer does not exist -- need to be consistent, so that they may be predictive. They also need to be well-posed in the sense of being stable, so that they might be used robustly. We propose a statistical form of leave-one-out stability, called CVEEE(loo) stability. Our main new results are two. We prove that for bounded loss classes CVEEE(loo) stability is (a) sufficient for generalization, that is convergence in probability of the empirical error to the expected error, for any algorithm satisfying it and, (b) necessary and sufficient for generalization and consistency of ERM. Thus CVEEE(loo) stability is a weak form of stability that represents a sufficient condition for generalization for general learning algorithms while subsuming the classical conditions for consistency of ERM. We discuss alternative forms of stability. In particular, we conclude that for ERM a certain form of well-posedness is equivalent to consistency.

DTIC

Consistency; Learning; Optimization; Risk; Stability

20070005290 State Univ. of New York, Binghamton, NY USA

On Developing Theory and Application of Community Generation

Zhang, Zhongfei; Oct 2006; 24 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8750-04-1-0234; Proj-558B

Report No.(s): AD-A459905; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459905; Avail.: CASI: A03, Hardcopy

The primary focus of this project was to develop a theory on community generation. Specific techniques as the Block Value Decomposition (BVD) and soft correspondence ensemble clustering frameworks, spectral relational clustering algorithm, and the general relation summary network model were designed and built. The BVD framework is a general framework for co-clustering dyadic relational data, which is a typical type of relational data in many applications. The soft correspondence ensemble clustering framework is a general framework for combining different clustering results together to deliver the optimal clustering result, which has many applications in distributed data mining and privacy-preserving data mining. The spectral relational clustering algorithm we have developed is a powerful relational data clustering algorithm that can be used for any type of relational data clustering. Finally, the relation summary network is the most general model that incorporates all the previous work as well as many existing models and algorithms in the literature which may be considered as the special cases of this model.

DTIC

Algorithms; Relational Data Bases

20070005335 Massachusetts Inst. of Tech., Cambridge, MA USA

A Wavelet-Based Method for Multiscale Tomographic Reconstruction

Bhatia, M; Karl, W C; Willsky, A S; Dec 18, 1993; 32 pp.; In English

Contract(s)/Grant(s): F49620-92-J-0002

Report No.(s): AD-A459987; MIT-LIDS-P-2182; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459987; Avail.: Defense Technical Information Center (DTIC)

We represent the standard ramp filter operator of the filtered back-projection (FBP) reconstruction in different bases composed of Haar and Daubechies compactly supported wavelets. The resulting multiscale representation of the ramp filter matrix operator is approximately diagonal. The accuracy of this diagonal approximation becomes better as wavelets with larger number of vanishing moments are used. This wavelet-based representation 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. Our multiscale reconstruction technique has the same computational complexity as the FBP reconstruction method. It differs from other multiscale reconstruction techniques in that (1) the object is defined through a multiscale transformation of the projection domain, and (2) we explicitly account for noise in the projection data by calculating maximum aposteriori probability (MAP) multiscale reconstruction estimates based on a chosen fractal prior on the multiscale object coefficients. The computational complexity of this MAP

solution is also the same as that of the FBP reconstruction. This is in contrast to commonly used methods of statistical regularization which result in computationally intensive optimization algorithms. The framework for multiscale reconstruction presented here can find application in object feature recognition directly from projection data, and regularization of imaging problems where the projection data are noisy.
DTIC
Image Reconstruction; Tomography; Wavelet Analysis

20070005356 Carnegie-Mellon Univ., Pittsburgh, PA USA
A Boolean Approach to Unbounded, Fully Symbolic Model Checking of Timed Automata
Seshia, Sanjit A; Bryant, Randal E; Mar 2003; 26 pp.; In English
Contract(s)/Grant(s): DAAD19-01-1-0485
Report No.(s): AD-A460035; CNA-CMU-CS-03-117; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460035; Avail.: CASI: A03, Hardcopy

We present a new approach to unbounded, fully symbolic model checking of timed automata that is based on an efficient translation of quantified separation logic to quantified Boolean logic. Our technique preserves the interpretation of clocks over the reals and can check any property expressed in the timed mu calculus. The core operations of eliminating quantifiers over real variables and deciding separation logic are respectively translated to eliminating quantifiers on Boolean variables and checking Boolean satisfiability (SAT). We can thus leverage well-known techniques for Boolean formulas, including Binary Decision Diagrams (BDDs) and recent advances in SAT and SAT-based quantifier elimination. We present preliminary empirical results for a BDD-based implementation of our method.
DTIC
Automata Theory; Boolean Algebra

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*.

20070003735 Lawrence Livermore National Lab., Livermore, CA USA
Predictive Science Academic Alliances Program (PSAAP) Technical White Paper Turbulent Mixing and Hydrodynamics
Schilling, O.; Steinkamp, M.; Baer, M.; Feb. 24, 2006; 12 pp.; In English
Report No.(s): DE2006-888627; UCRL-TR-219287; No Copyright; Avail.: Department of Energy Information Bridge

The design of efficient, high-gain capsules for inertial confinement fusion (ICF) and the modeling of supernova implosions and explosions requires a detailed understanding of the consequences of material interpenetration, hydrodynamic instabilities and mixing at molecular (or atomic) scales arising from perturbations at material interfaces, i.e., the Rayleigh-Taylor, Richtmyer-Meshkov and Kelvin-Helmholtz instabilities (buoyancy-, shock- and shear-induced instabilities, respectively). From a computational point of view, this requires the development of models for hydrodynamic instability growth from initial perturbations through the weakly- and strongly-nonlinear phases, and finally, to the late-time turbulent regime. In particular, modeling these processes completely and accurately is critical for demonstrating the feasibility and potential success of contemporary ICF capsule designs. A predictive computational capability for the effects of turbulent mass, momentum, energy and species transport, as well as material mixing, on the thermonuclear fusion process in ICF entails the development of turbulent transport and mixing or subgrid-scale models based on statistically-averaged or filtered evolution equations, respectively. The former models are typically referred to as Reynolds-averaged Navier-Stokes (RANS) (and related) models and the latter are referred to as large-eddy simulation (LES) models. The strong nonlinearity of the equations describing the hydrodynamics, thermodynamics, material properties and other multi-scale phenomena, together with the formal ensemble averaging or filtering procedure, introduce correlations of strongly-fluctuating fields and other a priori unclosed quantities that must be explicitly modeled to close the set of equations describing the implosion dynamics and burning of an ICF capsule.
NTIS
Confinement; Explosions; Hydrodynamics; Predictions; Thermodynamics; Turbulent Mixing

20070003740 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA, Lancaster Univ., UK

Simulation and Optimisation of a 100MA DC Photo-Injector

Hannon, F. E.; Hernandez-Garcia, C.; January 2006; 8 pp.; In English

Report No.(s): DE2006-888666; No Copyright; Avail.: National Technical Information Service (NTIS)

A prototype 100mA injector is presently being designed and manufactured jointly between Thomas Jefferson National Accelerator Facility (JLab) and Advanced Energy Systems (AES). This paper discusses the physics optimization and performance of the injector which has been studied using the space-charge tracking code ASTRA. The objective is to operate the 7MeV injector with 135pC electron bunches at 748.5MHz repetition rate. We show that the longitudinal and transverse electron bunch properties can be realized within the constraints of the design.

NTIS

Injectors; Optimization; Simulation

20070003744 Pacific Northwest National Lab., Richland, WA, USA

FY 2005 Miniature Spherical Retroreflectors Final Report

Anheier, N. C.; Bernacki, B. E.; Johnson, B. R.; Riley, B. J.; Sliger, W. A.; Dec. 2005; 42 pp.; In English

Report No.(s): DE2006-888714; PNNL-15577; No Copyright; Avail.: National Technical Information Service (NTIS)

Research done by the Infrared Photonics team at Pacific Northwest National Laboratory (PNNL) is focused on developing miniature spherical retroreflectors using the unique optical and material properties of chalcogenide glass to reduce both performance limiting spherical and chromatic aberrations. The optimized optical performance will provide efficient signal retroreflection that enables a broad range of remote detection scenarios for mid-wave infrared (MWIR) and long-wave infrared (LWIR) sensing applications. Miniature spherical retroreflectors can be developed to aid in the detection of signatures of nuclear proliferation or other chemical vapor or radiation signatures. Miniature spherical retroreflectors are not only well suited to traditional bistatic LIDAR methods for chemical plume detection and identification, but could enable remote detection of difficult semi-volatile chemical materials or low level radiation sources.

NTIS

Miniaturization; Retroreflectors

20070003745 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA

Performances of High Purity Niobium Cavities with Different Grain Sizes

Ciovati, G.; Kneisel, P.; Myneni, G. R.; Shattopadhyay, S.; January 2006; 8 pp.; In English

Report No.(s): DE2006-888727; No Copyright; Avail.: National Technical Information Service (NTIS)

Grain boundaries have for some time been suspected of influencing the performance of RF cavities made from high purity niobium by limiting the temperature dependent BCS surface resistance to a residual resistance because of impurity segregation and by causing field limitations due to flux penetration. We have carried out a comparative study of the RF behavior of 2.2 GHz TM010 cavities of identical shape, fabricated from single crystal niobium, niobium of grain sizes of the order of several cm2 and standard poly-crystalline material. All the cavities were treated with buffered chemical polishing (BCP), post-purified at 1250 C and 'in-situ' baked at 120 C. This contribution reports about the results of the measurements of the temperature dependence of the surface resistance Rs(T) and the Q0 vs. Eacc behavior at 2 K. From the analysis of the Rs(T) data at low RF fields material parameters such as gap value, mean free path and residual resistance could be extracted. The dependence of the Q-value on RF field was analyzed with respect to the medium field Q-slope, 'Q-drop' at high fields and the 'quench' fields. The best performance resulted in a breakdown field of (approx.) 165 mT, corresponding to an accelerating gradient of Eacc (approx.) 38 MV/m.

NTIS

Cavities; Grain Size; Niobium; Purity

20070003754 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA

Investigation of Hot-Spots as a Function of Material Removal in a Large-Grain Niobium Cavity

Ciovati, G.; Kneisel, P.; January 2006; 8 pp.; In English

Report No.(s): DE2006-888823; No Copyright; Avail.: National Technical Information Service (NTIS)

The performance of a single-cell cavity made of RRR \g 200 large-grain niobium has been investigated as a function of material removal by buffered chemical polishing. Temperature maps of the cavity surface at 1.7 and 2.0 K were taken for each step of chemical etching and revealed several 'hot-spots', which contribute to the degradation of the cavity quality factor as a function of the RF surface field, mostly at high field levels. It was found that the number of 'hot-spots' decreased for larger material removal. Interestingly, the losses of the ‘hot spots’ at different locations evolved differently for successive material removal. The cavity achieved peak surface magnetic fields of about of 130 mT and was limited mostly by thermal quench. By measuring the temperature dependence of the surface resistance at low field between 4.2 K and 1.7 K, the variation of niobium material parameters as a function of material removal could also be investigated. This contribution shows the results of the RF tests along with the temperature maps and the analysis of the losses caused by the ‘hot-spots’.

NTIS

Cavities; Niobium

20070003755 Stanford Linear Accelerator Center, CA, USA, London Univ., UK

Measurement of the CKM Matrix Element Vcb and Vub at the B-Factories

Menges, W.; January 2006; 8 pp.; In English

Report No.(s): DE2006-888782; SLAC-PUB-11958; No Copyright; Avail.: Department of Energy Information Bridge

Recent results on inclusive and exclusive semileptonic B decays from B-factories are presented. The impact of these measurements on the determination of the CKM matrix elements (V(sub ub)) and (V(sub cb)) is discussed.

NTIS

Mesons; Matrices (Mathematics)

20070003788 Lawrence Livermore National Lab., Livermore, CA USA

Phase Effects on Mesoscale Object X-ray Attenuation Radiographs

Martz, H. E.; Aufderheide, M. B.; Barty, A.; Hau-Riege, S.; Lehman, S. K.; Nov. 14, 2005; 8 pp.; In English

Report No.(s): DE2006-887289; UCRL-TR-217053; No Copyright; Avail.: National Technical Information Service (NTIS)

Digital x-ray radiography and computed tomography methods are commonly used to characterize mesoscale objects (mm size objects with (micro)m size features). However the ability of these methods to provide high spatial resolution images is dependent, in part, on object recovery algorithms that account for phase effects (1). The objective of this work is the development and validation of algorithms to model phase-contrast effects observed in x-ray radiographic systems, and to use these algorithms for quantitative object recovery. This work has three distinct tasks. First, we are modifying HADES (2,3) to model x-ray phase contrast and are investigating whether multislice techniques within the object are needed to fully capture the physics seen in x-ray data. Second, we are developing object recovery approaches. Third, we are validating these simulations against x-ray systems using well-known objects. At the end of this R&D, we will have a set of validated x-ray forward modeling codes including the effects of phase and an understanding of the current object recovery methods limitations.

NTIS

Algorithms; Computer Aided Tomography; Mesoscale Phenomena; Radiography; X Rays

20070003790 Stanford Linear Accelerator Center, CA, USA

New Perspectives for QCD From AdS/CFT

Brodsky, S. J.; January 2006; 14 pp.; In English

Report No.(s): DE2006-887468; SLAC-PUB-11976; No Copyright; Avail.: National Technical Information Service (NTIS)

The AdS/CFT correspondence between conformal field theory and string states in an extended space-time has provided new insights into not only hadron spectra, but also their light-front wavefunctions. We show that there is an exact correspondence between the fifth-dimensional coordinate of anti-de Sitter space z and a specific impact variable, sigma, which measures the separation of the constituents within the hadron in ordinary space-time. This connection allows one to predict the form of the light-front wavefunctions of mesons and baryons, the fundamental entities which encode hadron properties and scattering amplitudes. A new relativistic Schrodinger light-cone equation is found which reproduces the results obtained using the fifth-dimensional theory.

NTIS

Baryons; Hadrons; Quantum Chromodynamics

20070003791 Lawrence Livermore National Lab., Livermore, CA USA

MEMS Actuated Deformable Mirror

Papavasiliou, A.; OPilver, S.; Barbee, T.; Walton, C.; Cohn, M.; Nov. 11, 2005; 16 pp.; In English

Report No.(s): DE2006-888610; UCRL-TR-217023; No Copyright; Avail.: Department of Energy Information Bridge

This ongoing work concerns the creation of a deformable mirror by the integration of MEMS actuators with Nanolaminate

foils through metal compression boning. These mirrors will use the advantages of these disparate technologies to achieve dense actuation of a high-quality, continuous mirror surface. They will enable advanced adaptive optics systems in large terrestrial telescopes. While MEMS actuators provide very dense actuation with high precision they can not provide large forces typically necessary to deform conventional mirror surfaces. Nanolaminate foils can be fabricated with very high surface quality while their extraordinary mechanical properties enable very thin, flexible foils to survive the rigors of fabrication. Precise metal compression bonding allows the attachment of the fragile MEMS actuators to the thin nanolaminate foils without creating distortions at the bond sites. This paper will describe work in four major areas: (1) modeling and design, (2) bonding development, (3) nanolaminate foil development, (4) producing a prototype. A first-principles analytical model was created and used to determine the design parameters. A method of bonding was determined that is both strong, and minimizes the localized deformation or print through. Work has also been done to produce nanolaminate foils that are sufficiently thin, flexible and flat to be deformed by the MEMS actuators. Finally a prototype was produced by bonding thin, flexible nanolaminate foils to commercially available MEMS actuators.
NTIS
Deformable Mirrors; Deformation; Microelectromechanical Systems; Mirrors

20070003792 Lawrence Livermore National Lab., Livermore, CA USA
Certification of Completion of Level-2 Milestone 461: Deploy First Phase of I/O Infrastructure for Purple
Gary, M.; Wiltzius, D.; Nov. 23, 2005; 16 pp.; In English
Report No.(s): DE2006-888607; UCRL-TR-217288; No Copyright; Avail.: National Technical Information Service (NTIS)

This report describes the deployment and demonstration of the first phase of the I/O infrastructure for Purple. The report and the references herein are intended to certify the completion of the following Level 2 Milestone from the ASC FY04-05 Implementation Plan, due at the end of Quarter 4 in FY05. The milestone is defined as follows: ‘External networking infrastructure installation and performance analysis will be completed for the initial delivery of Purple. The external networking infrastructure includes incorporation of a new 10 Gigabit Ethernet fabric linking the platform to the LLNL High Performance Storage System (HPSS) and other center equipment. The LLNL archive will be upgraded to HPSS Release 5.1 to support the requirements of the machine and performance analysis will be completed using the newly deployed I/O infrastructure. Demonstrated throughput to the archive for this infrastructure will be a minimum of 1.5GB/s with a target of 3GB/s. Since Purple delivery is not scheduled until late Q3, demonstration of these performance goals will use parts of Purple and/or an aggregate of other existing resources.
NTIS
Certification; Computer Networks

20070003793 Jefferson (Thomas) National Accelerator Facility, Newport News, VA, USA
JLAB Ampere-Clast Cryomodule Conceptual Design
Rimmber, R. A.; Ciovati, G.; Daly, E. F.; Elliott, T.; Hick, W. R.; January 2006; 8 pp.; In English
Report No.(s): DE2006-888556; No Copyright; Avail.: National Technical Information Service (NTIS)

For the next generation of compact high-power FELs a new cryomodule is required that is capable of accelerating up to Ampere levels of beam current. Challenges include strong HOM damping, high HOM power and high fundamental-mode power (in operating scenarios without full energy recovery). For efficient use of space a high real-estate gradient is desirable and for economic operation good fundamental-mode efficiency is important. The technology must also be robust and should be based on well-proven and reliable technologies. For Ampere-class levels of beam current both halo interception and beam break-up (BBU) are important considerations. These factors tend to drive the designs to lower frequencies where the apertures are larger and the transverse impedances are lower. To achieve these goals we propose to use a compact waveguide-damped multi-cell cavity packaged in an SNS-style cryomodule.
NTIS
Damping; Rocks; Modules

20070003794 Brookhaven National Lab., Upton, NY USA
QT-Reummation for Polarized Semi-Inclusive Deep Inelastic Scattering
Koike, Y.; Nagashima, J.; Vogelsang, W.; January 2006; 10 pp.; In English
Report No.(s): DE2006-888482; BNL-76758; No Copyright; Avail.: Department of Energy Information Bridge

We study the transverse-momentum distribution of hadrons produced in semiinclusive deep-inelastic scattering. We consider cross sections for various combinations of the polarizations of the initial lepton and nucleon or the produced hadron,

for which we perform the resummation of large double-logarithmic perturbative corrections arising at small transverse momentum. We present phenomenological results for the process ep yields ewX for the typical kinematics in the COMPASS experiment. We discuss the impact of the perturbative resummation and of estimated non-perturbative contributions on the corresponding cross sections and their spin asymmetry.
NTIS
Hadrons; Inelastic Scattering; Transverse Momentum

20070003795 Brookhaven National Lab., Upton, NY USA
Summary of Beam Cooling and Intrabeam Scattering
Fedotov, A. V.; Meshkov, I. N.; Wei, J.; January 2006; 10 pp.; In English
Report No.(s): DE2006-888481; BNL-76754; No Copyright; Avail.: Department of Energy Information Bridge

For heavy-particle beams in storage rings where there is no significant synchrotron radiation damping, beam cooling is an essential tool in obtaining high phase-space density high brightness beams. Advances in various types of cooling such as electron, stochastic, laser and muon cooling are covered in dedicated Conferences. In this series of Workshops (HB2002-06), discussions are aimed only at a few specific subjects which are crucial for future projects. The discussion topics in our session closely followed those discussed during the HB2004 workshop. Specifically, we concentrated on the topics of electron cooling and intrabeam scattering, motivated by the design of the future high-energy coolers. These cooling projects at high-energy require accurate numerical modeling and experimental verification. A variety of tasks were put together at HB2004. In our working group we discussed a progress in addressing these tasks. We had 10 presentations (with additional presentations in the joint sessions) which followed by dedicated discussions. Our main topics of discussions: intrabeam scattering (IBS), electron cooling, and beam stability are summarized.
NTIS
Cooling; Scattering; Storage Rings (Particle Accelerators)

20070003796 Brookhaven National Lab., Upton, NY USA
Parton Bubble Model for Two Particle Angular Correlations at RHIC/LHC
Jun. 2006; 42 pp.; In English
Report No.(s): DE2006-888478; BNL-76747; No Copyright; Avail.: Department of Energy Information Bridge

In an earlier paper we developed a bubble model, based on a view we had shared with van Hove for over two decades. Namely, that if a quark-gluon plasma is produced in a high energy heavy ion collider, then its hadronization products would likely be emitted from small bubbles localized in phase space containing plasma. In this paper we refined the model to become a parton bubble model in which each localized bubble contains initially 3-4 partons which are almost entirely gluons forming a gluon hot spot. We greatly expanded the transverse momentum interval investigated, and thus are able to treat recombination effects within each bubble. We again utilize two particle correlations as a sensitive method for detecting the average bubble substructure. In this manuscript we make many predictions for angular correlations detectable at RHIC and which will be later modified to LHC conditions. Some early available low precision correlation analyses is qualitatively explained. However a critical consistency test of the model can be made with high precision data expected in the near future.
NTIS
Angular Correlation; Bubbles; Partons

20070003797 Brookhaven National Lab., Upton, NY USA
High Field Solenoid Magnets for Muon Cooling
Kahn, S. A.; Alsharo'a, M.; Hanlet, P.; Johnson, R. P.; Kuchnir, M.; Jun. 2006; 10 pp.; In English
Report No.(s): DE2006-888477; BNL-76744; No Copyright; Avail.: National Technical Information Service (NTIS)

Magnets made with high-temperature superconducting (HTS) coils operating at low temperatures have the potential to produce extremely high fields for use in accelerators and beam lines. The specific application of interest that we are proposing is to use a very high field (of the order of 50 Tesla) solenoid to provide a very small beta region for the final stages of cooling for a muon collider. With the commercial availability of HTS conductor based on BSCCO technology with high current carrying capacity at 4.2 K, very high field solenoid magnets should be possible. In this paper we will evaluate the technical issues associated with building this magnet. In particular we address how to mitigate the high Lorentz stresses associated with this high field magnet.
NTIS
Cooling; High Field Magnets; Magnets; Muons; Solenoids

20070003798 Brookhaven National Lab., Upton, NY USA

Analysis of the Magnetized Friction Force

January 2006; 12 pp.; In English

Report No.(s): DE2006-888476; No Copyright; Avail.: Department of Energy Information Bridge

A comprehensive examination of theoretical models for the friction force, in use by the electron cooling community, was performed. Here, they present their insights about the models gained as a result of comparison between the friction force formulas and direct numerical simulations, as well as studies of the cooling process as a whole.

NTIS

Cooling; Friction; Magnetization; Mathematical Models

20070003800 Brookhaven National Lab., Upton, NY USA

Experimental Studies of IBS in RHIC and Comparison with Theory

Fedotov, A. V.; Fishcer, W.; Tepikian, S.; Wei, J.; January 2006; 10 pp.; In English

Report No.(s): DE2006-888475; BNL-76739; No Copyright; Avail.: Department of Energy Information Bridge

A high-energy electron cooling system is presently being developed to overcome emittance growth due to Intra-beam Scattering (IBS) in RHIC. A critical item for choosing appropriate parameters of the cooler is an accurate description of the IBS. The analytic models were verified vs dedicated IBS measurements. Analysis of the 2004 data with the Au ions showed very good agreement for the longitudinal growth rates but significant disagreement with exact IBS models for the transverse growth rates. Experimental measurements were improved for the 2005 run with the Cu ions. Here, we present comparison of the 2005 data with theoretical models.

NTIS

Cooling; Heat Exchangers; Scattering

20070003802 Brookhaven National Lab., Upton, NY USA

Parton Orbital Angular Momentum

Bunce, G.; Fields, D.; Vogelsang, W.; January 2006; 116 pp.; In English

Report No.(s): DE2006-888470; BNL-75937; No Copyright; Avail.: Department of Energy Information Bridge

The joint UNM/RBRC Workshop on Parton Orbital Angular Momentum was held on February 24th through 26th at the University of New Mexico Department of Physics and Astronomy in Albuquerque, New Mexico, and was sponsored by The University of New Mexico (Physics Department, New Mexico Center for Particle Physics, Dean of Arts and Sciences, and Office of the Vice Provost for Research and Economic Development) and the NUN-BNL Research Center. The workshop was motivated by recent and upcoming experimental data based on methods which have been proposed to access partonic angular momenta, including Deeply Virtual Compton Scattering, measuring the Sivers functions, and measuring helicity dependent kt in jets. Our desire was to clarify the state of the art in the theoretical understanding in this area, and to help define what might be learned about partonic orbital angular momenta Erom present and upcoming high precision data, particularly at RHIC, Jlab, COMPASS and HERMES.

NTIS

Angular Momentum; Conferences; Partons

20070003803 Sandia National Labs., Albuquerque, NM USA

Energy Sustainability

Robinett, R. D.; Wilson, D. G.; Reed, A. W.; May 2006; 44 pp.; In English

Report No.(s): DE2006-887482; SAND2006-2759; No Copyright; Avail.: Department of Energy Information Bridge

Exergy is the elixir of life. Exergy is that portion of energy available to do work. Elixir is defined as a substance held capable of prolonging life indefinitely, which implies sustainability of life. In terms of mathematics and engineering, exergy sustainability is defined as the continuous compensation of irreversible entropy production in an open system with an impedance and capacity-matched persistent exergy source. Irreversible and nonequilibrium thermodynamic concepts are combined with self-organizing systems theories as well as nonlinear control and stability analyses to explain this definition. In particular, this paper provides a missing link in the analysis of self-organizing systems: a tie between irreversible thermodynamics and Hamiltonian systems. As a result of this work, the concept of ‘on the edge of chaos’ is formulated as a set of necessary and sufficient conditions for stability and performance of sustainable systems. This interplay between exergy rate and irreversible entropy production rate can be described as Yin and Yang control: the dialectic synthesis of opposing power flows. In addition, exergy is shown to be a fundamental driver and necessary input for sustainable systems, since exergy

input in the form of power is a single point of failure for self-organizing, adaptable systems.
NTIS
Entropy; Thermodynamics

20070003804 Rutherford Appleton Lab., Chilton, UK
Recent tau Physics Studies at BABAR
Wilson, F. F.; January 2006; 10 pp.; In English
Report No.(s): DE2006-887472; SLAC-PUB-11885; No Copyright; Avail.: National Technical Information Service (NTIS)

Recent results from (tau) physics studies at BABAR are presented with an emphasis on hadronic decays and lepton flavor violation studies.
NTIS
Hadrons; Leptons; Particle Decay

20070003805 Stanford Linear Accelerator Center, CA, USA, Saclay Research Centre, Gif-sur-Yvette, France, Montreal Univ., Quebec, Canada
Monitoring of Interaction-Point Parameters Using the 3-Dimensional Luminosity Distribution Measured at Pep-II
Viaud, B. F.; Kozanecki, W.; O'Grady, C.; Thompson, J.; Jul. 2006; 8 pp.; In English
Report No.(s): DE2006-887471; SLAC-PUB-11900; No Copyright; Avail.: National Technical Information Service (NTIS)

The 3-D luminosity distribution at the IP of the SLAC B-Factory is monitored using e(sup +)e(sup -) (yields) e(sup +)e(sup -), (mu)(sup +)(mu)(sup -) events reconstructed online in the BABAR detector. The transverse centroid and spatial orientation of the luminosity ellipsoid reliably monitor IP orbit drifts. The longitudinal centroid is sensitive to small variations in the average relative RF phase of the beams and provides a detailed measurement of the phase transient along the bunch train. The longitudinal luminosity distribution depends on the e(sup +,-) overlap bunch length and the vertical IP (beta)-functions. Relative variations in horizontal luminous size are detectable at the micron level. In addition to continuous on-line monitoring of all the parameters above, we performed detailed studies of their variation along the bunch train to investigate a temporary luminosity degradation. We also compare (beta)*(sub y) measurements, collected over a year of high-luminosity operation, with HER and LER lattice functions measured by resonant transverse excitation. Our bunch-length measurements are consistent with those obtained by other methods and provide direct evidence for bunch-length modulation.
NTIS
Luminosity; Three Dimensional Models

20070003807 Stanford Linear Accelerator Center, CA, USA
Probing QCD with Rare Charmless B Decays
Gradl, W.; Jul. 2006; 8 pp.; In English
Report No.(s): DE2006-885507; SLAC-PUB-11942; No Copyright; Avail.: Department of Energy Information Bridge

Rare charmless hadronic B decays are a good testing ground for QCD. In this paper we describe a selection of new measurements made by the BABAR and BELLE collaborations.
NTIS
Mesons; Quantum Chromodynamics

20070003808 Stanford Linear Accelerator Center, CA, USA, Stanford Univ., Stanford, CA USA
Evaluation of TCP Congestion Control Algorithms on the Windows Vista Platform
Li, Y. T.; Jun. 2006; 34 pp.; In English
Report No.(s): DE2006-885508; SLAC-TN-06-005; No Copyright; Avail.: National Technical Information Service (NTIS)

CTCP, an innovative TCP congestion control algorithm developed by Microsoft, is evaluated and compared to HSTCP and StandardTCP. Tests were performed on the production Internet from Stanford Linear Accelerator Center (SLAC) to various geographically located hosts to give a broad overview of the performances. We find that certain issues were apparent during testing (not directly related to the congestion control algorithms) which may skew results. With this in mind, we find that CTCP performed similarly to HSTCP across a multitude of different network environments. However, to improve the fairness and to reduce the impact of CTCP upon existing StandardTCP traffic, two areas of further research were investigated. Algorithmic additions to CTCP for burst control to reduce the aggressiveness of its cwnd increments demonstrated beneficial improvements in both fairness and throughput over the original CTCP algorithm. Similarly, (gamma) auto-tuning algorithms were investigated to dynamically adapt CTCP flows to their network conditions for optimal performance. While the effects

of these auto-tuning algorithms when used in addition to burst control showed little to no benefit to fairness nor throughput for the limited number of network paths tested, one of the auto-tuning algorithms performed such that there was negligible impact upon StandardTCP. With these improvements, CTCP was found to perform better than HSTCP in terms of fairness and similarly in terms of throughput under the production environments tested.
NTIS
Algorithms; Windows (Computer Programs); Performance Tests

20070004691 Stanford Linear Accelerator Center, CA, USA, Saclay Research Centre, Gif-sur-Yvette, France, Montreal Univ., Quebec, Canada
Characterization of the Pep-II Colliding-Beam Phase Space by the Boost Method
Weaver, M.; Kozanecki, W.; Viaud, B.; January 2006; 8 pp.; In English
Report No.(s): DE2006-887069; SLAC-PUB-11906; No Copyright; Avail.: National Technical Information Service (NTIS)

We present a novel approach to characterize the colliding-beam phase space at the interaction point of the energy-asymmetric PEP-II B-Factory. The method exploits the fact that the transverse-boost distribution of e(sup +)e(sup -) (yields) (mu)(sup +)(mu)(sup -) events reconstructed in the BABAR detector reflects that of the colliding electrons and positrons. The mean boost direction, when combined with the measured orientation of the luminous ellipsoid, determines the e(sup +)-e(sup -) crossing angles. The average angular spread of the transverse boost vector provides an accurate measure of the angular divergence of the incoming high-energy beam, confirming the presence of a sizeable dynamic-(beta) effect. The longitudinal and transverse dependence of the boost angular spread also allow to extract from the continuously-monitored distributions detailed information about the emittances and IP (beta)-functions of both beams during high-luminosity operation.
NTIS
Storage Rings (Particle Accelerators); Characterization; Beams (Radiation)

20070004699 Brookhaven National Lab., Upton, NY USA
Threshold Resummation Effects in the Polarized Drell-Yan Process at GSI and J-PARC
Yokoya, H.; Vogelsang, W.; January 2006; 10 pp.; In English
Report No.(s): DE2006-886844; BNL-75904-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

We present studies of QCD corrections to dilepton production in transversely polarized pp and (bar p)p scattering. In particular we briefly discuss the effects of NNLL threshold resummation on the rapidity distribution of the lepton pair.
NTIS
Quantum Chromodynamics; Polarization (Waves)

20070004708 Stanford Linear Accelerator Center, CA, USA
SABER Optical Design
Erickson, R.; BAne, K.; Emma, P.; Nosochkov, Y.; Jul. 2006; 8 pp.; In English
Report No.(s): DE2006-885506; SLAC-PUB-11944; No Copyright; Avail.: National Technical Information Service (NTIS)

SABER, the South Arc Beam Experimental Region, is a proposed new beam line facility designed to replace the Final Focus Test Beam at SLAC. In this paper, we outline the optical design features and beam parameters now envisioned for SABER. A magnetic chicane to compress positron bunches for SABER and a bypass line that could transport electrons or positrons from the two-thirds point of the linac to SABER, bypassing the LCLS systems, are also discussed.
NTIS
Design Analysis; Optical Equipment; Linear Accelerators

20070004714 General Electric Co., Niskayuna, NY, USA
Gallium Nitride Crystals and Wafers and Method of Making
D'Evelyn, M. P.; Park, D. S.; LeBoeuf, S. F.; Burton, L.; Narang, K. J.; 13 Dec 04; 30 pp.; In English
Contract(s)/Grant(s): NIST-70NANB9H3020
Patent Info.: Filed Filed 13 Dec 04; US-Patent-Appl-SN-11-010 507
Report No.(s): PB2007-100881; No Copyright; Avail.: CASI: A03, Hardcopy

A GaN crystal having up to about 5 mole percent of at least one of aluminum, indium, and combinations thereof. The GaN crystal has at least one grain having a diameter greater than 2 mm, a dislocation density less than about 10 (sup 4) cm (sup-2), and is substantially free of tilt boundaries.

NTIS

Crystals; Gallium Nitrides; Nitrides; Wafers

20070004726 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, Paul Scherrer Inst., Wuerenlingen, Switzerland, Rijeka Univ. formerly (Yugoslavia), Serbia

SLS Optics Beamline

Flechsig, U.; Abela, R.; Betemps, R.; Blumer, H.; Frank, K.; January 2006; 4 pp.; In English

Report No.(s): DE2006-888979; No Copyright; Avail.: National Technical Information Service (NTIS)

A multipurpose beamline for tests and developments in the field of x-ray optics and synchrotron radiation instrumentation in general is under construction at the Swiss Light Source (SLS) bending magnet X05DA. The beamline uses a newly developed UHV compatible, 100 micron thick, brazed CVD diamond vacuum window. The very compact cryogenically cooled channel cut Si(111) monochromator and bendable 1:1 toroidal focusing mirror at 7:75 m from the source point are installed inside the shielding tunnel. The beamline covers a photon energy range of about 6 to 17 keV. We expect 5x10(sup 11) photons/s within a 100 micron spot and a resolving power of 1300. The monochromator and focusing mirror can be retracted independently for unfocused monochromatic and focused 'white' light operation respectively.

NTIS

Synchrotron Radiation; Light Sources; X Ray Optics

20070004727 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA

Studies of E-Cloud Build up the the FNAL Main Injector and for the LHC

Furman, M. S.; January 2006; 5 pp.; In English

Report No.(s): DE2006-888977; No Copyright; Avail.: National Technical Information Service (NTIS)

We present a summary of recent simulation studies of the electron-cloud (EC) build-up for the FNAL MI and for the LHC. In the first case we pay particular attention to the dependence on bunch intensity N(sub b) at injection energy assuming the nominal bunch spacing t(sub b) = 19 ns, and we focus on the dipole magnets and field-free regions. The saturated value of the average EC density shows a clear threshold in N(sub b) beyond which the beam will be approximately neutralized on average. For the case of the LHC we limit our discussion to arc dipoles at collision energy, and bunch spacings t(sub b) = 25 ns or t(sub b) = 75 ns. The main variables exercised in this study are N(sub b) and the peak value of the secondary emission yield (SEY) (delta)(sub max). For t(sub b) = 25 ns we conclude that the EC power deposition is comfortably below the available cooling capacity of the cryogenic system if (delta)(sub max) is below (approx.) 1.2 at nominal N(sub b). For t(sub b) = 75 ns, the EC power deposition is insignificant. As a byproduct of this exercise, we reach a detailed understanding of the significant role played by the backscattered secondary electrons.

NTIS

Injectors; Electron Clouds; Electron Beams; Secondary Emission

20070004740 Argonne National Lab., IL, USA

History of the ZGS 500 MeV Booster

Apr. 2006; 34 pp.; In English

Report No.(s): DE2006-885494; ANL-HEP-TR-06-44; No Copyright; Avail.: National Technical Information Service (NTIS)

The history of the design and construction of the Argonne 500 MeV booster proton synchrotron from 1969 to 1982 is described. This accelerator has since been in steady use for the past 25 years to power the Argonne Intense Pulsed Neutron Source (IPNS).

NTIS

Accelerators; Neutron Sources

20070004914 Pan American Univ., Edinburg, TX USA

Study of Nonlinear Oscillations of Elastic Membrane

Sep 26, 2006; 5 pp.; In English

Contract(s)/Grant(s): DAAD19-03-1-0204

Report No.(s): AD-A459494; No Copyright; Avail.: CASI: A01, Hardcopy

No abstract available

Membrane Structures; Oscillations; Elastic Properties; Nonlinearity

20070004924 Aerospace Medical Research Labs., Wright-Patterson AFB, OH USA
Dynamic Preload as an Impact Protection Concept
Jan 1982; 7 pp.; In English
Report No.(s): AD-A459555; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Prestressing; Protection; Impact; Dynamic Characteristics

20070004953 Radiation Monitoring Devices, Inc., Watertown, MA, USA
Lu(sup 1)xI(sup 3):Ce(sup x): A Scintillator for Gamma Ray Spectroscopy and Time-Of Flight Pet
Shah, K. S.; 23 Sep 04; 21 pp.; In English
Contract(s)/Grant(s): DE-AC03-76SF00098; NIH-R01-CA6791-1
Patent Info.: Filed Filed 23 Sep 04; US-Patent-Appl-SN-10-948-914
Report No.(s): PB2007-100944; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention concerns very fast scintillator materials comprising lutetium iodide doped with Cerium (Lu(sub 1)-xI(sub 3)(Ce(sub x) LuI(sub 3)Ce). The LuI(sub 3) scintillator material has surprisingly good characteristics including high light output, high gamma ray stopping efficiency, fast response, low cost, good proportionality, and minimal afterglow that the material is useful for gamma ray spectroscopy, medical imaging, nuclear and high energy physics research, diffraction, non-destructive testing, nuclear treaty verification and safeguards, and geological exploration. The timing resolution of the scintillators of the present invention provide compositions capable of resolving the position of an annihilation event within a portion of a human body cross-section.
NTIS

Cerium; Gamma Ray Spectrometers; Iodides; Lutetium; Patent Applications; Positrons; Scintillation Counters; Tomography

20070004954 Stanford Linear Accelerator Center, CA, USA, Fermi National Accelerator Lab., Batavia, IL, USA, Deutsches Elektronen-Synchrotron, Hamburg, Germany
High Precision SC Cavity Diagnostics with Hom Measurements
Frisch, J.; Hendrickson, L.; McCormick, D.; May, J.; Molloy, S.; Aug. 2006; 5 pp.; In English
Report No.(s): DE2006-889665; SLAC-PUB-12066; No Copyright; Avail.: National Technical Information Service (NTIS)

Experiments at the FLASH linac at DESY have demonstrated that the Higher Order Modes induced in Superconducting Cavities can be used to provide a variety of beam and cavity diagnostics. The centers of the cavities can be determined from the beam orbit which produces minimum power in the dipole HOM modes. The phase and amplitude of the dipole modes can be used as a high resolution beam position monitor, and the phase of the monopole modes to measure the beam phase relative to the accelerator RF. Beam orbit feedback which minimizes the dipole HOM power in a set of structures has been demonstrated. For most SC accelerators, the existing HOM couplers provide the necessary signals, and the down mix and digitizing electronics are straightforward, similar to those for a conventional BPM.
NTIS

Cavities; Diagnosis; Superconducting Cavity Resonators

20070004955 Radiation Monitoring Devices, Inc., Watertown, MA, USA
Very Fast Doped LaBr(sup 3) Scintillators and Time-Of-Flight Pet
Shah, K. S.; 23 Sep 04; 23 pp.; In English
Contract(s)/Grant(s): DE-AC03-76SF00098; NIH-R01-CA6791-1
Patent Info.: Filed Filed 23 Sep 04; US-Patent-Appl-SN-10-948-913
Report No.(s): PB2007-100943; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention concerns very fast scintillator materials capable of resolving the position of an annihilation event within a portion of a human body cross-section. In one embodiment, the scintillator material comprises LaBr(sub 3) doped with cerium. Particular attention is drawn to LaBr(sub 3) doped with a quantity of Ce that is chosen for improving the timing properties, in particular the rise time and resultant timing resolution of the scintillator, and locational capabilities of the scintillator.
NTIS

Bromides; Cerium; Doped Crystals; Lanthanum; Patent Applications; Positrons; Scintillation Counters; Tomography

20070004956 Stanford Univ., Stanford, CA USA, Stanford Linear Accelerator Center, CA, USA

Topological Twisted Sigma Model with H-Flux Revisited

Chuang, W. Y.; January 2006; 16 pp.; In English

Report No.(s): DE2006-889667; SLAC-PUB-12049; No Copyright; Avail.: Department of Energy Information Bridge

In this paper we revisit the topological twisted sigma model with H-flux. We explicitly expand and then twist the worldsheet Lagrangian for bi-Hermitian geometry. we show that the resulting action consists of a BRST exact term and pullback terms, which only depend on one of the two generalized complex structures and the B-field. We then discuss the topological feature of the model.

NTIS

Lagrangian Function; Mathematical Models

20070004958 Birmingham Univ., UK, California Univ., Berkeley, CA USA, Cambridge Univ., Cambridge, UK, Deutsches Elektronen-Synchrotron, Hamburg, Germany

Direct Measurement of Geometric and Resistive Wakefields in Tapered Collimators for the International Linear Collider

Watson, N. K.; Adey, D.; Stockton, M. C.; Kolomensky, Y.; Slater, M.; January 2006; 3 pp.; In English

Report No.(s): DE2006-889668; SLAC-PUB-12029; No Copyright; Avail.: Department of Energy Information Bridge

Precise collimation of the beam halo is required in the International Linear Collider (ILC) to prevent beam losses near the interaction region that could cause unacceptable backgrounds for the physics detector. The necessarily small apertures of the collimators lead to transverse wakefields that may result in beam deflections and increased emittance. A set of collimator wakefield measurements has previously been performed in the ASSET region of the SLAC Linac. We report on the next phase of this program, which is carried out at the recently commissioned End Station A (ESA) test facility at SLAC. Measurements of resistive and geometric wakefields using tapered collimators are compared with model predictions from MAFIA and GdfidL and with analytic calculations.

NTIS

Collimators; Linear Accelerators; Geometry; Analysis (Mathematics)

20070004960 Stanford Linear Accelerator Center, CA, USA

Measurement of the B+ Yields eta l+ nu and B+ Yields eta l+ nu Branching Fractions Using Upsilon(4S) yields B Bbar Event Tagged bu a Fully Reconstructed B Meson. The BABAR Collaboration

January 2006; 18 pp.; In English

Report No.(s): DE2006-889669; SLAC-PUB-11996; No Copyright; Avail.: Department of Energy Information Bridge

We report preliminary measurements of the exclusive charmless semileptonic branching fractions of the B(sup +) (yields) (eta)(ell)(sup +)(nu) and B(sup +) (yields) (eta) (ell)(sup +)(nu) decays. These measurements are based on 316 fb(sup -1) of data collected at the (Upsilon)(4S) resonance by the BABAR detector. In events in which the decay of one B meson to a hadronic final state is fully reconstructed, the semileptonic decay of the recoiling B meson is identified by the detection of a charged lepton and an (eta) or (eta). We measure the branching fraction (Beta)(B(sup +) (yields) (eta)(ell)(sup +)(nu)) = (0.84 (+-) 0.27 (+-) 0.21) x 10(sup -4), where the first error is statistical and the second one systematic. We also set an upper limit on the branching fraction of (Beta)(B(sup +) (yields) (eta)(ell)(sup +)(nu)) \h 1.4 x 10(sup -4) and (Beta)(B(sup +) (yields) (eta)'(ell)(sup +)(nu)) \h 1.3 x 10(sup -4) at the 90% confidence level.

NTIS

Mesons; Hadrons; Confidence Limits; Errors

20070004962 Stanford Linear Accelerator Center, CA, USA

Measurement of Decay Amplitudes of B to ccbar K asterik with an Angular Analysis, for ccbar=J/Psi, Psi2S and chic 1. The BABAR Collaboration

Jul. 28, 2006; 19 pp.; In English

Report No.(s): DE2006-889670; SLAC-PUB-11995; No Copyright; Avail.: Department of Energy Information Bridge

We perform the first three-dimensional measurement of the amplitudes of B (yields) (psi)(2S)K* and B (yields) (chi)(sub c1)K* decays and update our previous measurement for B (yields) J/(psi) K*. We use a data sample collected with the BABAR detector at the PEP-II storage ring, representing 232 million produced B(bar B) pairs. The longitudinal polarization of decays to the 1(sup ++) (chi)(sub c1) meson together with a K* meson, is found to be larger than that for the decay to the 1(sup --) (Psi) mesons. No direct CP-violating charge asymmetry is observed.

NTIS

Asymmetry; Storage Rings (Particle Accelerators); Mesons; Particle Decay

20070004963 Sandia National Labs., Albuquerque, NM USA

Quantum Gate Decomposition Algorithms

Slepoy, A.; Jul. 2006; 12 pp.; In English

Report No.(s): DE2006-889415; SAND2006-3440; No Copyright; Avail.: Department of Energy Information Bridge

Quantum computing algorithms can be conveniently expressed in a format of a quantum logical circuits. Such circuits consist of sequential coupled operations, termed 'quantum gates', or quantum analogs of bits called qubits. We review a recently proposed method for constructing general 'quantum gates' operating on n qubits, as composed of a sequence of generic elementary 'gates'.

NTIS

Algorithms; Decomposition

20070004964 Stanford Linear Accelerator Center, CA, USA

Measurement of Time-Dependent CP Asymmetries in B(sup 0) Yields K(sup 0)(sub s) Decays. The BABAR Collaboration

Aug. 17, 2006; 17 pp.; In English

Report No.(s): DE2006-889671; SLAC-PUB-11987; No Copyright; Avail.: Department of Energy Information Bridge

The authors present an updated measurement of the time-dependent CP-violating asymmetry in B(sup 0) (yields) K(sub S)(sup 0)K(sub S)(sup 0)K(sub S)(sup 0) decays based on 347 million (Upsilon)(4S) (yields) B(bar B) decays collected with the BABAR detector at the PEP-II asymmetric-energy B factory at SLAC. The authors obtain the CP asymmetries S(sub f) = -0.66 (+-) 0.26 (+-) 0.08 and C(sub f) = -0.14 (+-) 0.22 (+-) 0.05, where the first uncertainties are statistical and the second systematic.

NTIS

Asymmetry; Time Dependence

20070004968 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA

Nucleon resonance studies in phenomenological analysis of the CLAS data on double charged pion photo and electroproduction

Mokeev, V. I.; Burkert, V. D.; Oct. 2005; 3 pp.; In English

Report No.(s): DE2006-889376; No Copyright; Avail.: Department of Energy Information Bridge

First comprehensive data on the evolution of nucleon resonance photocouplings with photon virtuality Q(sup 2) are presented for excited proton states in the mass range from 1.4 to 2.0 GeV.

NTIS

Nucleons; Phenomenology; Pions

20070004970 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA

High Gradient Operation with the CEBAF Upgrade RF Control System

Hovater, C.; Davis, K.; Dong, H.; Hofler, A.; King, L.; January 2006; 3 pp.; In English

Report No.(s): DE2006-889367; No Copyright; Avail.: National Technical Information Service (NTIS)

The CEBAF Accelerator at Jefferson Lab is presently a 6 GeV five pass electron accelerator consisting of two superconducting linacs joined by independent magnetic transport arcs. Energy will be upgraded to 12 GeV with the addition of 10 new high gradient cryomodules (17+ MV/m). The higher gradients pose significant challenges beyond what the present analog low level RF (LLRF) control systems can handle reliably; therefore, a new LLRF control system is needed. A prototype system has been developed incorporating a large FPGA and using digital down and up conversion to minimize the need for analog components. The new system is more flexible and less susceptible to drifts and component nonlinearities. Because resonance control is critical to reach high gradients quickly, the new cryomodules will include a piezoelectric tuner for each cavity, and the LLRF controls must incorporate both feedback and feed-forward methods to achieve optimal resonance control performance. This paper discusses development of the new RF system, system performance for phase and amplitude stability

and resonance control under Lorentz detuning measured during recent tests on a prototype cryomodule.
NTIS
Gradients; Linear Accelerators; Radio Frequencies

20070004972 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA
Commissioning of the Digital LLRF for CEBAF Injector/Separator
Plawski, T.; Dong, H.; Hovater, C.; Lahti, G.; King, L.; January 2006; 3 pp.; In English
Report No.(s): DE2006-889366; No Copyright; Avail.: National Technical Information Service (NTIS)

The design and production of the 499 MHz digital Low-Level RF control system for the CEBAF accelerator has been completed. The first five systems have been installed for use with the CEBAF Separator RF deflecting cavities operating at 499 MHz. The next four systems were installed in the injector on the chopping cavities (also 499 MHz deflecting cavities). The new LLRF system replaced an analog system that was over 15 years old. For initial testing, an extensive acceptance plan along with a LLRF test stand was developed and incorporated to assure system performance as well as reliability. Various VHDL firmware was developed to support operation of this system and included specific operational diagnostics. Once the acceptance tests were completed, the new systems were installed in the accelerator in parallel with the existing analog LLRF for extensive in-situ testing and comparison. Once commissioned, the new RF systems were assigned to the CEBAF accelerator and turned over to Accelerator Operations. This paper will address the VHDL firmware evolution, the automated tests, and the performance measurements made throughout the installation and commissioning process.
NTIS
Injectors; Linear Accelerators; Separators

20070004982 Stanford Linear Accelerator Center, CA, USA
Comparison Between H-Ion and Heat Cleaning of CU-Metal Cathodes
Dowell, D. H.; King, F. K.; Kirby, R. E.; Schmerge, J. F.; January 2006; 3 pp.; In English
Report No.(s): DE2006-889663; SLAC-PUB-12070; No Copyright; Avail.: National Technical Information Service (NTIS)

Understanding the quantum efficiency (QE) of a metal photocathode in an s-band RF gun is important to limit the drive laser energy requirement and provide the best quality electron beam. Systematic measurements of the qe vs. wavelength for varying surface contamination have been performed on copper samples using x-ray photoelectron spectroscopy (XPS). The sample is first cleaned to the theoretical limit of QE using a 1 keV hydrogen ion beam. The H-ion beam cleans an area approximately 1cm in diameter and has no effect on the surface roughness while removing essentially all contaminants and lowering the work function to 4.3eV. The sample is then exposed to atmospheric contaminants (nitrogen and oxygen) and measured again with XPS to determine the degree of contamination and their effect on the QE. These results and comparison with theory are presented.
NTIS
Cathodes; Cleaning; Hydrogen Ions

20070004983 Lawrence Livermore National Lab., Livermore, CA USA
Analysis of a Gross Counting Decision Metric for Use in Threat Detection During Cargo Container Inspection
Hall, J.; Apr. 28, 2006; 20 pp.; In English
Report No.(s): DE2006-889431; UCRL-TR-221251; No Copyright; Avail.: National Technical Information Service (NTIS)

LLNL is actively engaged in the development of a variety of advanced technologies for use in detecting potential threats in sea-going cargo containers, particularly the presence of hidden special nuclear materials (SNM). One such project is the so-called ‘Nuclear Car Wash’ (NCW), which uses a high-energy neutron probe to scan the container. High-energy, (Beta)-delayed (Gamma)-rays emitted during the decay of short-lived, neutron-induced fission products are then taken as a signature of fissionable material. There are a number of different threat decision metrics that one could imagine using in conjunction with an inspection system such as the NCW; however, the most straightforward approach might be to simply compare the total number of counts that our detector records during some suitably chosen time interval to the average background signal that one would expect from a ‘clean’ container during the same interval. The purpose of this report is to describe the basic statistical properties of a decision metric of this sort and outline the procedures for using it in experimental practice.
NTIS
Cargo; Counting; Fission Products; Inspection

20070004987 Lawrence Livermore National Lab., Livermore, CA USA
LFR Lead Cooled Fast Ractor
Cinotti, L.; Fazio, C.; Knebel, J.; Moti, S.; Abderrahim, H. A.; May 16, 2006; 28 pp.; In English
Report No.(s): DE2006-889453; UCRL-CONF-221396; No Copyright; Avail.: National Technical Information Service (NTIS)

The main purpose of this paper is to present the current status of development of the Lead-cooled Fast Reactor (LFR) in Generation IV (GEN IV), including the European contribution, to identify needed R&D and to present the corresponding GEN IV International Forum (GIF) R&D plan (1) to support the future development and deployment of lead-cooled fast reactors. The approach of the GIF plan is to consider the research priorities of each member country in proposing an integrated, coordinated R&D program to achieve common objectives, while avoiding duplication of effort. The integrated plan recognizes two principal technology tracks: (1) a small, transportable system of 10-100 MWe size that features a very long refuelling interval, and (2) a larger-sized system rated at about 600 MWe, intended for central station power generation. This paper provides some details of the important European contributions to the development of the LFR. Sixteen European organizations have, in fact, taken the initiative to present to the European Commission the proposal for a Specific Targeted Research and Training Project (STREP) devoted to the development of a European Lead-cooled System, known as the ELSY project; two additional organizations from the US and Korea have joined the project.
NTIS
Fast Nuclear Reactors; Research and Development; Coolants

20070004988 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Intrabeam Scattering in the NLC Main Damping Rings
Wolski, A.; Jun. 08, 2004; 9 pp.; In English
Report No.(s): DE2006-889310; No Copyright; Avail.: National Technical Information Service (NTIS)

We use Banes approximation to the Bjorken-Mtingwa theory of intrabeam scattering to calculate the emittance growth as a function of bunch charge in the KEK ATF. We find that our results are consistent with the experimental data. We then calculate the emittance growth in the NLC Main Damping Rings using the same formulae; we allow for some uncertainty in the ATF data by using two different values for the Coulomb log factor in the formulae for the emittance growth rates. We find that despite the IBS emittance growth, it should still be possible to achieve the specified transverse and longitudinal emittances in the NLC Main Damping Rings at the specified bunch charge.
NTIS
Damping; Scattering

20070004994 Lawrence Livermore National Lab., Livermore, CA USA
High Magnetic Field Generation for Laser-Plasma Experiments
Pollock, B. B.; Froula, D. H.; Davis, P. F.; Ross, J. S.; Fulkerson, S.; May 07, 2006; 12 pp.; In English
Report No.(s): DE2006-889448; UCRL-CONF-221183; No Copyright; Avail.: National Technical Information Service (NTIS)

An electromagnetic solenoid was developed to study the effect of magnetic fields on electron thermal transport in laser plasmas. The solenoid, which is driven by a pulsed power system suppling 30 kJ, achieves magnetic fields of 13 T. The field strength was measured on the solenoid axis with a magnetic probe and optical Zeeman splitting. The measurements agree well with analytical estimates. A method for optimizing the solenoid design to achieve magnetic fields exceeding 20 T is presented.
NTIS
Laser Plasmas; Lasers; Magnetic Fields; Plasma Diagnostics

20070004995 Lawrence Livermore National Lab., Livermore, CA USA
Time-Resolved Soft X-Ray Imaging (SXRI) Diagnostic for Use at the NIF and OMEGA Lasers
Schneider, M. B.; Holder, J. P.; James, D. L.; Bruns, H. C.; Celeste, J. R.; May 05, 2006; 28 pp.; In English
Report No.(s): DE2006-889445; UCRL-CONF-221117; No Copyright; Avail.: National Technical Information Service (NTIS)

The soft x-ray imager (SXRI) built for the first experiments at the National Ignition Facility (NIF) has four soft x-ray channels and one hard x-ray channel. The SXRI is a snout that mounts to a four strip gated imager. This produces four soft x-ray images per strip, which can be separated in time by (approx.) 60psec. Each soft x-ray channel consists of a mirror plus a filter. The diagnostic was used to study x-ray burnthrough of hot hohlraum targets at the NIF and OMEGA lasers. The SXRI

snout design and issues involved in selecting the desired soft x-ray channels are discussed.
NTIS
Lasers; Plasma Diagnostics; X Ray Imagery

20070004996 Lawrence Livermore National Lab., Livermore, CA USA
Solid-Density Plasma Characterization with X-Ray Scattering on the 200-J Janus Laser
Neumayer, P. B.; Gregori, G.; Ravasio, A.; Price, D.; Bastea, M.; May 07, 2006; 10 pp.; In English
Report No.(s): DE2006-889444; UCRL-CONF-221178; No Copyright; Avail.: National Technical Information Service (NTIS)

We present collective x-ray scattering (CXS) measurements using a Chlorine He-(alpha) x-ray source pumped with less than 200 J of laser energy. The experimental scattering spectra show plasmon resonances from shocked samples. These experiments use only 10(sup 12) x-ray photons at the sample of which 10(sup -5) have been scattered and detected with a highly efficient curved crystal spectrometer. Our results demonstrate that x-ray scattering is a viable technique on smaller laser facilities making CXS measurements accessible to a broad scientific community.
NTIS
Characterization; Janus; Lasers; Plasma Diagnostics; Plasmas (Physics); X Ray Scattering; X Ray Sources

20070004998 Lawrence Livermore National Lab., Livermore, CA USA
Analysis Procedures for Double-Shell Target Concentricity and Wall Thickness
Sain, W. D.; Brown, W. D.; Martz, H. E.; Schneberk, D. J.; Mar. 28, 2006; 28 pp.; In English
Report No.(s): DE2006-889447; UCRL-TR-220178; No Copyright; Avail.: National Technical Information Service (NTIS)

The LLNL Target Fabrication Team (TFT) asked the Center for Non-Destructive Characterization (CNDC) to use CNDC's KCAT or Xradia's Micro computed tomography (CT) system to collect three-dimensional (3D) tomographic data of a set of double-shell targets and determine, among other items, the following: (1) the concentricity of the outer surface of the inner shell with respect to the inner surface of the outer shell with an accuracy of 1-2 micrometers, and (2) the wall thickness uniformity of the outer shell with an accuracy of 1-2 micrometers. The CNDC used Xradia's Micro CT system to collect the data. Bill Brown performed the concentricity analysis, and John Sain performed the wall thickness uniformity analysis. Harry Martz provided theoretical guidance, and Dan Schneberk contributed technical (software) support. This document outlines the analysis procedures used in each case.
NTIS
Concentricity; Laser Targets; Target Thickness; Walls

20070004999 Lawrence Livermore National Lab., Livermore, CA USA
How Accurately Can We Calculate Neutrons Slowing Down in Water
Cullen, D. E.; Blomquiest, R. N.; Greene, M.; Lent, E.; MacFarlane, R.; Apr. 01, 2006; 60 pp.; In English
Report No.(s): DE2006-889442; UCRL-TR-220605; No Copyright; Avail.: National Technical Information Service (NTIS)

We have compared the results produced by a variety of currently available Monte Carlo neutron transport codes for the relatively simple problem of a fast source of neutrons slowing down and thermalizing in water. Initial comparisons showed rather large differences in the calculated flux; up to 80% differences. By working together we iterated to improve the results by: (1) insuring that all codes were using the same data, (2) improving the models used by the codes, and (3) correcting errors in the codes; no code is perfect. Even after a number of iterations we still found differences, demonstrating that our Monte Carlo and supporting codes are far from perfect; in particularly we found that the often overlooked nuclear data processing codes can be the weakest link in our systems of codes. The results presented here represent the today's state-of-the-art, in the sense that all of the Monte Carlo codes are modern, widely available and used codes.
NTIS
Neutrons; Water

20070005000 Lawrence Livermore National Lab., Livermore, CA USA
Pressure Model for the Vacuum System for the Electron Gun and Injector for LCLS Final Design Report
Tung, L. S.; Eriksson, L.; May 09, 2006; 32 pp.; In English
Report No.(s): DE2006-889436; UCRL-TR-221253; No Copyright; Avail.: National Technical Information Service (NTIS)

The vacuum system of the injector for the Linac Coherent Light Source (LCLS) has been analyzed and configured by the Lawrence Livermore National Laboratory's New Technologies Engineering Division (NTED) as requested by the

SLAC/LCLS program. The vacuum system layout and detailed analyses for the injector are presented in this final design report. The vacuum system was analyzed and optimized using a coupled gas load balance model of sub-volumes of the components to be evacuated.
NTIS
Electron Guns; Injectors; Vacuum Systems

20070005001 Lawrence Livermore National Lab., Livermore, CA USA
Multispectral X-Ray Imaging for Core Temperature and Density Maps Retrieval in Direct Drive Implosions
Tommasini, R.; Koch, J. A.; Izumi, N.; Welser, L. A.; Mancini, R. C.; May 07, 2006; 10 pp.; In English
Report No.(s): DE2006-889439; UCRL-CONF-221179; No Copyright; Avail.: National Technical Information Service (NTIS)

We report on the experiments aimed at obtaining core temperature and density maps in direct drive implosions at the OMEGA Laser Facility using multi-monochromatic X-ray imagers. These instruments use an array of pinholes and a flat multilayer mirror to provide unique multi-spectral images distributed over a wide spectral range. Using Argon as a dopant in the DD-filled plastic shells produces emission images in the Ar He-b and Ly-b spectral regions. These images allow the retrieval of temperature and density maps of the plasma. We deployed three identical multi-monochromatic X-ray imagers in a quasi-orthogonal line-of-sight configuration to allow tomographic reconstruction of the structure of the imploding core.
NTIS
Argon; Implosions; X Rays; Imaging Techniques

20070005003 Lawrence Livermore National Lab., Livermore, CA USA
High Energy X-Ray Imager for Inertial Confinment Fusion at the National Ignition Facility
Tommasini, R.; Koch, J. A.; Young, B.; Ng, E.; Phillips, T.; May 07, 2006; 12 pp.; In English
Report No.(s): DE2006-889438; UCRL-CONF-221181; No Copyright; Avail.: National Technical Information Service (NTIS)

X-ray imaging is a fundamental diagnostic tool for inertial confinement fusion (ICF) research, and provides data on the size and the shape of the core in implosions. We report on the feasibility and performance analysis of an ignition x-ray imager to be used on cryogenic DT implosions at the National Ignition Facility. The system is intended to provide time-integrated, broadband, moderate-energy x-ray core images of imploding ICF capsules. It is optimized with respect to spatial-resolution, signal-to-background and signal-to-noise ratios, taking into account the extreme operating conditions expected at NIF due to high expected neutrons yields, gamma-rays, and x-rays from laser-plasma interactions.
NTIS
Ignition; Inertial Confinement Fusion; X Rays; Imaging Techniques

20070005021 Fish and Richardson, P.C., Dallas, TX, USA
Characterization of Materials with Optically Shaped Acoustic Waveforms
Choi, J. D.; Paxton, B.; Feurer, T.; Yamaguchi, M.; Nelson, K. A.; 21 Jul 05; 4 pp.; In English
Contract(s)/Grant(s): NSF-CHE-0212375; DE-FG02-00ER15087
Patent Info.: Filed Filed 21 Jul 05; US-Patent-Appl-SN-11-186-401
Report No.(s): PB2007-103881; No Copyright; Avail.: CASI: A01, Hardcopy

A method for characterizing one or more properties of a sample using acoustic waveforms is disclosed, and comprises directing a sequence of at least three optical pulses to the sample to generate an acoustic response in the sample at a frequency corresponding to the pulse sequence, varying the timing of one or more of the pulses in the sequence to vary the frequency of the acoustic response in the sample, and measuring the strength of the acoustic response as a function of the varied frequency to determine information about the sample.
NTIS
Sound Waves; Waveforms; Characterization; Acoustics

20070005049 California Univ., Lawrence Livermore Lab., Livermore, CA, USA
Particle Tracking and Simulation on the .NET Framework
Nishimura, H.; Scarvie, T.; January 2006; 3 pp.; In English
Report No.(s): DE2006-888987; LBNL-60607; No Copyright; Avail.: Department of Energy Information Bridge

Particle tracking and simulation studies are becoming increasingly complex. In addition to the use of more sophisticated

graphics, interactive scripting is becoming popular. Compatibility with different control systems requires network and database capabilities. It is not a trivial task to fulfill all the various requirements without sacrificing runtime performance. We evaluated the effectiveness of the .NET framework by converting a C++ simulation code to CI(pound sign). The portability to other platforms is mentioned in terms of Mono.
NTIS
Computerized Simulation; Particle Motion; Particle Tracks

20070005053 Sandia National Labs., Albuquerque, NM USA, Barcelona Univ., Spain, Bergen Univ., Norway, California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
B Meson Decays to omega K*, omega p, omega omega, omega phi and omega F(sub o)
Aubert, B.; Baraate, R.; Bona, M.; Boutigny, D.; Couderc, R.; January 2006; 12 pp.; In English
Report No.(s): DE2006-887473; SLAC-PUB-11848; No Copyright; Avail.: National Technical Information Service (NTIS)

The authors describe searches for B meson decays to the charmless vector-vector final states (omega)K*, (omega)(rho), (omega)(omega), and (omega)(phi), with 233 x 10(sup 6) B(overbar B) pairs produced in e(sup +) e(sup -) annihilation at square root (S) = 10.58 GeV.
NTIS
Mesons; Particle Decay

20070005056 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA
Recent Developments in SRF Cavity Science and Performance
Ciovati, G.; January 2006; 5 pp.; In English
Report No.(s): DE2006-889028; No Copyright; Avail.: National Technical Information Service (NTIS)

The performances of SRF cavities made of high purity bulk niobium have been improving in the last few years and surface magnetic fields (Bp) close to the thermodynamic critical field of niobium have been achieved in a few cases. The recommendation made in 2004 in favor of SRF as the technology of choice for the International Linear Collider (ILC), requires improving the reliability of multi-cell cavities operating at accelerating gradients (Eacc) of the order of 35 MV/m. Additionally, a better understanding of the present limitations to cavity performance, such as the high-field Q-drop is needed. This contribution presents some recent developments in SRF cavity science and performance. Among the most significant advances of the last few years, new cavity shapes with lower ratio Bp/Eacc were designed and tested. Cavities made of large-grain niobium became available, promising lower cost at comparable performance to standard fine-grain ones and several tests on single-cell cavities were done to gain a better understanding of highfield losses. In addition, studies to improve the reliability of electropolishing are being carried out by several research groups.
NTIS
Cavities; Linear Accelerators

20070005057 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Baryon-Strangness Correlations: A Diagnostic of Strongly Interacting Matter
Koch, V.; Majumder, A.; Randrup, J.; January 2006; 4 pp.; In English
Report No.(s): DE2006-888755; No Copyright; Avail.: Department of Energy Information Bridge

The correlation between baryon number and strangeness elucidates the nature of strongly interacting matter. This diagnostic can be extracted theoretically from lattice QCD calculations and experimentally from event-by-event fluctuations. The analysis of present lattice results above the critical temperature severely limits the presence of qq bound states, thus supporting a picture of independent (quasi)quarks. Details may be found in (1).
NTIS
Baryons; Strangeness; Correlation

20070005058 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, National Lab. for High Energy Physics, Ibaraki, Japan
Space Charge and Equilibrium Emittances in Damping Rings
Venturini, M.; Oide, K.; Wolski, A.; January 2006; 4 pp.; In English
Report No.(s): DE2006-889307; No Copyright; Avail.: National Technical Information Service (NTIS)

We present a model of dynamics to account for the possible impact of space charge on the equilibrium emittances in

storage rings and apply the model to study the current design of the International Linear Collider (ILC) damping rings.
NTIS
Damping; Emittance; Space Charge

20070005060 Brookhaven National Lab., Upton, NY USA
Novel Chamber Design for an In-Vacuum Cryo-Cooled Mini-Gap Undulator
Hu, J. P.; Forester, C. L.; Skaritka, J. R.; Waterman, D.; January 2006; 10 pp.; In English
Report No.(s): DE2006-889291; BNL-76802-2006-CP; No Copyright; Avail.: National Technical Information Service (NTIS)

A stainless steel, Ultra-High Vacuum (UHV) chamber, featuring a large vertical rectangular port (53W by 16H), has been fabricated to house the one-meter magnet assembly of a newly installed undulator insertion device for beamline X-25 at the National Synchrotron Light Source. To achieve UHV, the new chamber is equipped with a differential ion pump, NEG pump, nude ion gauge, residual gas analyzer, and an all metal roughing valve. Temperature of the magnet assembly is maintained below 90oC during vacuum bake. The large rectangular port cover is sealed to the main flange of the chamber using a one-piece flat aluminum gasket and special sealing surfaces developed exclusively by Nor-Cal Products, Inc. The large flange provides easy access to the gap of the installed magnet girders for in situ magnetic measurements and shimming. Special window ports were designed into the cover and chamber for manipulation of optical micrometers external to the chamber to provide precise measurements of the in-vacuum magnet gap. The vacuum chamber assembly features independently vacuum-isolated feedthroughs that can be used for either water-or-cryogenic refrigerationcooling of the monolithic magnet girders. This would allow for cryogenic cooled permanent magnet operation and has been successfully tested within temperature range of +100oC to -150oC. Details of the undulator assembly for beamline X-25 is described in the paper.
NTIS
Cryogenics; Stainless Steels; Vacuum; Vacuum Chambers; Wiggler Magnets

20070005061 Brookhaven National Lab., Upton, NY USA
Cooling Force Measurement in CELSIUS
Galnander, B.; Fedotov, A. V.; Litvinenko, V. N.; Lofnes, T.; Sidorin, A.; January 2006; 12 pp.; In English
Report No.(s): DE2006-888474; BNL-76740; No Copyright; Avail.: Department of Energy Information Bridge

The design of future high energy coolers relies heavily on extending the results of cooling force measurements into new regimes by using simulation codes. In order to carefully benchmark these codes we have accurately measured the longitudinal friction force in CELSIUS by recording the phase shift between the beam and the RF voltage while varying the RF frequency. Moreover, parameter dependencies on the electron current, solenoid magnetic field and magnetic field alignment were carried out.
NTIS
Cooling; Computerized Simulation

20070005062 Brookhaven National Lab., Upton, NY USA
Proposal for an Experimental Program in Neutrino Physics and Proton Decay in the Homestake Laboratory
Diwan, M.; Jul. 2006; 60 pp.; In English
Report No.(s): DE2006-889290; BNL-76798-2006-IR; No Copyright; Avail.: Department of Energy Information Bridge

This report is intended to describe first, the principal physics reasons for an ambitious experimental program in neutrino physics and proton decay based on construction of a series of massive water Cherenkov detectors located deep underground (4850 ft) in the Homestake Mine of the South Dakota Science and Technology Authority (SDSTA); and second, the engineering design of the underground chambers to house the Cherenkov detector modules; and third, the conceptual design of the water Cherenkov detectors themselves for this purpose. In this proposal we show the event rates and physics sensitivity for beams from both FNAL (1300 km distant from Homestake) and BNL (2540 km distant from Homestake). The program we propose will benefit with a beam from FNAL because of the high intensities currently available from the Main Injector with modest upgrades. The possibility of tuning the primary proton energy over a large range from 30 to 120 GeV also adds considerable flexibility to the program from FNAL. On the other hand the beam from BNL over the larger distance will produce very large matter effects, and consequently a hint of new physics (beyond CP violation) can be better tested with that configuration. In this proposal we focus on the CP violation physics. Included in this document are preliminary costs and time-to-completion estimates which have been exposed to acknowledged experts in their respective areas. This presentation is not, however, to be taken as a technical design report with the extensive documentation and contingency costs that a TDR

usually entails. Nevertheless, some contingency factors have been included in the estimates given here. The essential ideas expressed here were first laid out in a letter of intent to the interim director of the Homestake Laboratory on July 26, 2001. Since that time, the prospect of a laboratory in the Homestake Mine has been realized, and the design of a long baseline neutrino experiment has been refined. The extrapolation contained in this proposal is within the common domain of thinking in the area of physics discussed here. It needs now only the encouragement of the funding agencies, NSF and DOE.
NTIS
Cerenkov Counters; Neutrinos; Particle Decay; Protons

20070005065 Brookhaven National Lab., Upton, NY USA
Vertical Beam Size Control in TLS and TPS
Kuo, C. C.; Chen, J. R.; Chou, P. J.; Chang, H. P.; Hsu, K. T.; Jul. 2006; 5 pp.; In English
Report No.(s): DE2006-889289; BNL-75466-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

Vertical beam size control is an important issue in the light source operations. The horizontal-vertical betatron coupling and vertical dispersion were measured and corrected to small values in the TLS 1.5 GeV storage ring. Estimated beam sizes are compared with the measured values. By employing an effective transverse damping system, the vertical beam blow-up due to transverse coherent instabilities, such as the fast-ion beam instability, was suppressed. As a result, the light source is very stable. In NSRRC we are designing an ultra low emittance 3-GeV storage ring and its designed vertical beam size could be as small as a few microns. The ground and mechanic vibration effects, and coherent instabilities could spoil the expected photon brightness due to blowup of the vertical beam size if not well taken care of. The contributions of these effects to vertical beam size increase will be evaluated and the counter measures to minimize them will be proposed and reported in this paper.
NTIS
Betatrons; Brightness; Light Sources

20070005067 Brookhaven National Lab., Upton, NY USA
Comparative Studies of Proton Accelertors for High Power Applications
Weng, W. T.; Jun. 2006; 7 pp.; In English
Report No.(s): DE2006-889287; BNL-75669-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

There are many applications requiring high power proton accelerators of various kinds. However, each type of proton accelerator can only provide beam with certain characteristics, hence the match of accelerators and their applications needs careful evaluation. In this talk, the beam parameters and perfonnance limitations of linac, cyclotron, synchrotron, and FFAG accelerators are studied and their relative merits for application in neutron, muon, neutrino, and ADS will be assessed in terms of beam energy, intensity, bunch length, repetition rate, and beam power requirements. A possible match between the applications and the accelerator of choice is presented in a matrix form. The accelerator physics and technology issues and challenges involved will also be discussed.
NTIS
Evaluation; Performance Tests; Protons

20070005069 Stanford Linear Accelerator Center, CA, USA, Ohio State Univ., Columbus, OH, USA
New Developments in Measurements of CP Violation
Benelli, G.; Aug. 2006; 6 pp.; In English
Report No.(s): DE2006-889183; SLAC-PUB-12056; No Copyright; Avail.: Department of Energy Information Bridge

We present several alternative techniques used by the BABAR Collaboration in order to measure the Unitarity Triangle angle . We also present the results of two searches designed to improve the measurements of sin(2) using penguin B decay modes by reducing the hadronic corrections uncertainties.
NTIS
CP Violation; Invariance; Particle Decay

20070005070 Stanford Linear Accelerator Center, CA, USA
Gravitational Gauge Mediation
Kitano, R.; Aug. 2006; 11 pp.; In English
Report No.(s): DE2006-889163; SLAC-PUB-11953; No Copyright; Avail.: Department of Energy Information Bridge

It is often the case that naive introduction of the messenger sector to supersymmetry breaking models causes the

supersymmetry restoration. We discuss a possibility of stabilizing the supersymmetry broken vacuum by the gravitational interaction. August 2006
NTIS
Gravitational Effects; Measuring Instruments

20070005072 Stanford Linear Accelerator Center, CA, USA
ILC Linac R and D at SLAC
Adolphsen, C.; Aug. 2006; 4 pp.; In English
Report No.(s): DE2006-889162; SLAC-PUB-12046; No Copyright; Avail.: Department of Energy Information Bridge

Since the ITRP recommendation in August 2004 to use superconducting rf technology for a next generation linear collider, the former NLC Group at SLAC has been actively pursuing a broad range of R&D for this collider (the ILC). In this paper, the programs concerning linac technology are reviewed. Current activities include the development of a Marx-style modulator and a 10 MW sheet-beam klystron, operation of an L-band (1.3 GHz) rf source using an SNS HVCM modulator and commercial klystrons, design of a more efficient and less costly rf distribution system, construction of a coupler component test stand, fabrication of a prototype positron capture cavity, beam tests of prototype S-band linac beam position monitors and preparations for magnetic center stability measurements of a prototype SC linac quad.
NTIS
Linear Accelerators; Research and Development

20070005074 Stanford Linear Accelerator Center, CA, USA
Spin Rotation and Energy Compression in the ILC Linac-to-Ring Beamline
Batygin, Y. K.; Aug. 04, 2006; 19 pp.; In English
Report No.(s): DE2006-889149; SLAC-PUB-12044; No Copyright; Avail.: Department of Energy Information Bridge

The Linac-to Ring (LTR) beamline for positron beam injection into the damping ring at an energy of 5 GeV is considered. The beamline performs spin rotation and energy compression of the positron beam extracted from the booster linac. The lattice includes four 90-deg phaseadvance FODO cells with bending magnets placed between them, a solenoid and RF structure. Basic parameters and optimal configuration details are discussed. An analytical treatment of the beamline is performed.
NTIS
Linear Accelerators; Positrons; Rotation

20070005075 Grenoble-1 Univ., Annecy, France, Barcelona Univ., Spain, Bari Univ., Italy, Academia Sinica, Beijing, China
Measurements of the Decays B0-\gD0bar pp bar, B0-\gD*0pp bar, B0-\gD-pp bar/pi+, and B0-\gD*-pp bar/pi+
Aubert, B.; Barate, R.; Bona, M.; Boutigny, D.; Coderc, F.; Jul. 2006; 14 pp.; In English
Report No.(s): DE2006-887470; SLAC-PUB-11933; No Copyright; Avail.: Department of Energy Information Bridge

We present measurements of branching fractions of B(sup 0) decays to multi-body final states containing protons, based on 232 million (gamma)(4S) yields B(overbar B) decays collected with the BABAR detector at the SLAC PEP-II asymmetric-energy B factory.
NTIS
Mesons; Particle Decay

20070005076 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA
Spin Structure Functions: Proton/Deuteron Measurements in the Resonance Region
Jones, M. K.; Oct. 2005; 10 pp.; In English
Report No.(s): DE2006-887157; No Copyright; Avail.: Department of Energy Information Bridge

The RSS experiment ran in Hall C at Jefferson Lab and measured the proton and deuteron beam-target asymmetries for parallel and perpendicular target fields over a W range from pion threshold to 1.9 GeV at Q(sup 2) (approx) 1.3 GeV(sup 2). Preliminary results for the proton spin structure functions g(sub 1) and g(sub 2) are presented.
NTIS
Asymmetry; Deuterons; Protons; Targets

20070005077 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA

Factorization and Transverse Momentum in SIDIS at JLab

Bosted, P. E.; January 2005; 12 pp.; In English

Report No.(s): DE2006-887161; No Copyright; Avail.: Department of Energy Information Bridge

Data for pion electroproduction from both hydrogen and deuterium targets satisfy factorization tests in the kinematic region Q(sup 2) \g 1 GeV(sup 2), 0.15 \h x \h 0.45, W \g 2 GeV, M(sub x) \g 1.5 GeV, and 0.3 \h z \h 0.6, for both spin-averaged and spin-dependent scattering. The (pi)(sup +)/(pi)(sup -) ratio of polarized SIDIS is found to exhibit a surprisingly large p(sub t) dependence.

NTIS

Factorization; Transverse Momentum

20070005080 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA

Jefferson Lab Phenomenology: Selected Highlights

Melnitchouk, W.; January 2006; 14 pp.; In English

Report No.(s): DE2006-887119; No Copyright; Avail.: National Technical Information Service (NTIS)

An overview of recent experimental highlights from Jefferson Lab is presented. We review the status of baryon spectroscopy, including the search for pentaquarks, as well as measurements of electromagnetic form factors of the nucleon, featuring the proton G(sub E)/G(sub M) ratio and the determination of the strangeness form factors. In inclusive scattering, we describe recent studies of quark-hadron duality in structure functions in the resonance-scaling transition region, and outline future physics plans at an energy upgraded 12 GeV facility.

NTIS

Baryons; Phenomenology; Spectroscopy

20070005095 North Carolina Central Univ., Durham, NC, USA, Saint Petersburg State Univ., Saint Petersburg, Russian Federation

Study of the (sub Lambda)(sup 7)He Hypernucleus in Formalism of the Faddeev Equations

Filikhin, I.; Suslov, V. M.; Vlahovic, B.; Feb. 01, 2006; 10 pp.; In English

Report No.(s): DE2006-886688; No Copyright; Avail.: Department of Energy Information Bridge

P-shell A = 7 hypernuclei are considered in the cluster (sub (Lambda))(sup 5)He + N + N model. The folding procedure are applied to construct the (sub (Lambda))(sup 5)He-N interaction. We use the OBE simulating NSC97f potential for (Lambda)N interaction and various phenomenological potentials for (alpha)(Lambda) interaction. Configuration space Faddeev calculations are performed for hyperon binding energy of the (sub (Lambda))(sup 7)He(1/2(sup +)) and (sub (lambda))(sup 7)Li(1/2(sup +) and 3/2(sup +), T=0) nuclei. Predicted value for B(sub (Lambda))((sub (Lambda))(sup 7)He) is 5.35 MeV. This value is obtained when the (sup (Lambda))(sup 6)He(2(sup -)) excitation energy is equal 0.26 MeV by the adjustment of pair (sub (Lambda))(sup 5)He-N effective potential to reproduce the experimental value of the (sub (Lambda))(sup 7)Li(3/2(sup +)) excitation energy. Our results are compared with those of E. Hiyama et al.

NTIS

Faddeev Equations; Formalism; Hypernuclei

20070005096 Institute of Gas Technology, Chicago, IL, USA, Fermi National Accelerator Lab., Batavia, IL, USA, California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, Argonne National Lab., IL USA

Muon Cooling RF R and D Program

Torun, Y.; Bross, A.; Li, D.; Moretti, A.; Norem, J.; Mar. 2006; 10 pp.; In English

Report No.(s): DE2006-886687; No Copyright; Avail.: Department of Energy Information Bridge

Cooling muon beams in flight requires absorbers to reduce the muon momentum, accelerating fields to replace the lost momentum in the longitudinal direction, and static solenoidal magnetic fields to focus the muon beams. The process is most efficient if both the magnetic fields and accelerating fields are high and the rf frequency is low. We have conducted tests to determine the operating envelope of high-gradient accelerating cavities in strong static magnetic fields. These studies have already produced useful information on dark currents, magnetic fields and breakdown in cavities. In addition to continuing our program at 805 MHz, we are starting to test a 201 MHz cavity and are planning to look at a variety of appropriate geometries and materials. In parallel with these activities, we are supporting R&D on models and surface structure.

NTIS

Cooling; Muons; Radio Frequencies; Research and Development

20070005107 Deutsches Elektronen-Synchrotron, Hamburg, Germany
Perfect Electrode to Suppress Secondary Electrons Inside the Magnets
Wang, L.; Fukuma, H.; Kurokawa, S.; Pivi, M.; Jul. 2006; 8 pp.; In English
Report No.(s): DE2006-887068; SLAC-PUB-11962; No Copyright; Avail.: National Technical Information Service (NTIS)

An electron cloud due to multipacting in the positron ring of B-factories and the damping ring of the International Linear Collider (ILC) is one of the main concerns. The electron cloud in the drift region can be suppressed by a solenoid. However, the solenoid doesnt work inside a magnet. Numerical studies show that there is strong multipacting in a dipole magnet of a B-factory positron ring. Electrons also can be trapped inside quadrupole and sextupole magnets. The electron cloud from dipole magnets and wigglers in the positron damping ring of the ILC gives a critical limitation on the choice of a circumference of the damping ring, which directly results in a choice of two 6km rings as the baseline for the positron damping ring. Various electrodes have been studied using the program CLOUDLAND. Our studies show that a wire type of the electrode with a few hundred voltages works perfectly to kill the secondary electrons inside various magnets.

NTIS

Damping; Electrodes; Electrons; Magnets

20070005120 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA, Massachusetts Inst. of Tech., Cambridge, MA, USA
Local Duality in Spin Structure Functions g1(p) and g1(d)
Prok, Y.; Feb. 2006; 4 pp.; In English
Report No.(s): DE2006-887116; No Copyright; Avail.: Department of Energy Information Bridge

Inclusive double spin asymmetries obtained by scattering polarized electrons off polarized protons and deuterons have been analyzed to address the issue of quark hadron duality in the polarized spin structure functions gp 1 and gd 1. A polarized electron beam, solid polarized NH3 and ND3 targets and the CEBAF Large Acceptance Spectrometer (CLAS) in Hall B were used to collect the data. The resulting gp 1 and gd 1 were averaged over the nucleon resonance energy region (M \hW \h2.00 Gev), and three lowest lying resonances individually for tests of global and local duality.

NTIS

Deuterons; Electron Spin; Asymmetry

20070005138 Grenoble-1 Univ., Annecy, France, Barcelona Univ., Spain, Bari Univ., Italy, Academia Sinica, Beijing, China
Measurement of B Decays to PhiKGamma
Aubert, B.; Barate, R.; Bona, M.; Boutigny, D.; Couderc, F.; Jul. 20, 2006; 20 pp.; In English
Report No.(s): DE2006-887469; SLAC-PUB-11967; No Copyright; Avail.: National Technical Information Service (NTIS)

We measure the branching fraction of the radiative B(sup -) decay (Beta)(B(sup -) (yields) (phi)K(sup -)(gamma)) = (3.46 (+-) 0.57(sub -0.37)(sup +0.39)) x 10(sup -6), and set an upper limit on the radiative (bar B)(sup 0) decay (Beta(((bar B)(sup 0) (yields) (phi)(bar K)(sup 0)(gamma)) \h 2.71 x 10(sup -6) at 90% confidence level. We also measure the direct CP asymmetry of the B(sup -) (yields) (phi)K(sup -)(gamma) mode (Alpha)(sub CP) = (-26.4 (+-) 14.3 (+-) 4.8)%. The uncertainties are statistical and systematic, respectively. These measurements are based on 207 fb(sup -1) of data collected at the (Upsilon)(4S) resonance with the BABAR detector.

NTIS

High Energy Interactions; Particle Decay; Branching (Physics)

20070005143 Stanford Linear Accelerator Center, CA, USA
Projected Life of the SLAC Linac Braze Joints: Braze Integrity and Corrosion of Cooling Water Hardware on Accelerator Sections
Glesener, W. F.; Garwin, E. L.; Jul. 2006; 12 pp.; In English
Report No.(s): DE2006-887074; SLAC-TN-06-006; No Copyright; Avail.: National Technical Information Service (NTIS)

The objective of this study was to ascertain the condition of braze joints and cooling water hardware from an accelerator section after prolonged use. Metallographic analysis was used to examine critical sites on an accelerator section that had been in use for more than 30 years. The end flange assembly showed no internal operational damage or external environmental effects. The cavity cylinder stack showed no internal operational damage however the internal surface was highly oxidized. The internal surface of the cooling water tubing was uniformly corroding at a rate of about 1 mil per year and showed no evidence of pitting. Tee fitting internal surfaces are corroding at non-uniform rates due to general corrosion and pitting. Remaining service life of the cooling water jacket is estimated to be about 20 years or year 2027. At this time, water supply

pressure will exceed allowable fitting pressure due to corrosion of tubing walls.
NTIS
Brazing; Cooling; Corrosion; Linear Accelerators; Soldered Joints; Water

20070005144 Old Dominion Univ., Norfolk, VA, USA, Tel-Aviv Univ., Ramat-Aviv, Tel-Aviv, Israel, Pennsylvania State Univ., University Park, PA, USA, Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA
Transverse Imaging of the Proton in Exclusive Diffractive PP Scattering
Hyde-Wright, C. E.; Frankfurt, L.; Strikman, M.; Weiss, C.; Jul. 24, 2006; 8 pp.; In English
Report No.(s): DE2006-887319; No Copyright; Avail.: Department of Energy Information Bridge

In a forthcoming paper we describe a new approach to rapidity gap survival (RGS) in the production of high-mass systems (H = dijet, Higgs, etc.) in exclusive double-gap diffractive pp scattering, pp -\g p + H + p. It is based on the idea that hard and soft interactions are approximately independent (QCD factorization), and allows us to calculate the RGS probability in a model-independent way in terms of the gluon generalized parton distributions (GPDs) in the colliding protons and the pp elastic scattering amplitude. Here we focus on the transverse momentum dependence of the cross section. By measuring the ‘diffraction pattern’, one can perform detailed tests of the interplay of hard and soft interactions, and even extract information about the gluon GPD in the proton from the data.
NTIS
Diffraction; Elastic Scattering; Imaging Techniques; Protons; Scattering

20070005146 Lawrence Livermore National Lab., Livermore, CA USA
Gratings for High Energy Petawatt Lasers
Nguyen, H. T.; Britten, J. A.; Carlson, T. C.; Nissen, J. D.; Summers, L. J.; Nov. 11, 2005; 14 pp.; In English
Report No.(s): DE2006-887293; UCRL-CONF-217007; No Copyright; Avail.: National Technical Information Service (NTIS)

To enable high-energy petawatt laser operation we have developed the processing methods and tooling that produced both the worlds largest multilayer dielectric reflection grating and the worlds highest laser damage resistant gratings. We have successfully delivered the first ever 80 cm aperture multilayer dielectric grating to LLNLs Titan Intense Short Pulse Laser Facility. We report on the design, fabrication and characterization of multilayer dielectric diffraction gratings.
NTIS
Dielectrics; High Power Lasers; Gratings (Spectra)

20070005151 Lawrence Livermore National Lab., Livermore, CA USA
Relativistic Effects on the Equation of State of the Light Actinides
Landa, A.; Soderlind, P.; Nov. 09, 2005; 12 pp.; In English
Report No.(s): DE2006-887283; UCRL-CONF-216957; No Copyright; Avail.: Department of Energy Information Bridge

The effect of the relativistic spin-orbit (SO) interaction on the bonding in the early actinides has been investigated by means of electronic-structure calculations. Specifically, the equation of state (EOS) for the face-centered cubic (fcc) model systems of these metals have been calculated from the first-principles density-functional theory (DFT). Traditionally, the SO interaction in electronic-structure methods is implemented as a perturbation to the Hamiltonian that is solved for basis functions that explicitly do not depend on SO coupling. Here this approximation is shown to compare well with the fully relativistic Dirac treatment. It is further shown that SO coupling has a gradually increasing effect on the EOS as one proceeds through the actinides and the effect is diminished as density increases.
NTIS
Actinide Series; Equations of State; Relativistic Effects

20070005156 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, Tech-X Corp., Boulder, CO, USA, California Univ., Berkeley, CA USA
New Simulation Capabilities of Electron Clouds in Ion Beams with Large Tune Depression
Vay, J. L.; Furman, M. A.; Seidl, P. A.; Cohen, R. H.; Stoltz, P. H.; January 2006; 4 pp.; In English
Report No.(s): DE2006-888989; No Copyright; Avail.: National Technical Information Service (NTIS)

We have developed a new, comprehensive set of simulation tools aimed at modeling the interaction of intense ion beams and electron clouds (e-clouds). The set contains the 3-D accelerator PIC code WARP and the 2-D slice e-cloud code POSINST (M. Furman, this workshop, paper TUAX05), as well as a merger of the two, augmented by new modules for impact ionization

and neutral gas generation. The new capability runs on workstations or parallel supercomputers and contains advanced features such as mesh refinement, disparate adaptive time stepping, and a new drift-Lorentz particle mover for tracking charged particles in magnetic fields using large time steps. It is being applied to the modeling of ion beams (1 MeV, 180 mA, K+) for heavy ion inertial fusion and warm dense matter studies, as they interact with electron clouds in the High- Current Experiment (HCX) (experimental results discussed by A. Molvik, this workshop, paper THAW02). We describe the capabilities and present recent simulation results with detailed comparisons against the HCX experiment, as well as their application (in a different regime) to the modeling of e-clouds in the Large Hadron Collider (LHC).
NTIS
Electron Clouds; Ion Beams; Simulation

20070005161 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA
Physics at the Thomas Jefferson National Accelerator Facility
Cardman, L. S.; January 2006; 16 pp.; In English
Report No.(s): DE2006-887123; No Copyright; Avail.: National Technical Information Service (NTIS)

The Continuous Electron Accelerator Facility, CEBAF, located at the Thomas Jefferson National Accelerator Facility, is devoted to the investigation of the electromagnetic structure of mesons, nucleons, and nuclei using high energy, high duty-cycle electron and photon beams. Selected experimental results of particular interest to the MAMI community are presented.
NTIS
Linear Accelerators; Flavor (Particle Physics)

20070005258 Naval Research Lab., Washington, DC USA
Delta-Sigma UHF Digital Waveform Generator
Talapatra, Sukomal; Alatishe, Jimmy O; Leibowitz, Lawrence M; Sep 26, 2006; 19 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459859; NRL/FR/5344--06-10139; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459859; Avail.: CASI: A03, Hardcopy

The Naval Research Laboratory (NRL) has developed and built a prototype UHF Digital Waveform Generator (DWG) based on the Delta-Sigma algorithm, which allows arbitrary waveform generation. It provides predicted low phase and spurious noise. Much of the design uses field programmable gate arrays (FPGAs) for single-bit digital waveform generation. Four filter topologies were initially considered, including cascade, hybrid, parallel, and transposed. The cascade and parallel forms were eliminated because they imposed a heavy computational burden on the system. After analyzing the transposed topology, quantization error in higher-order filters led to the selection of the hybrid form of the digital filter because it performed well. A 12th order hybrid filter was selected and implemented using FPGAs. The NRL Development demonstrates that a simple-to-code single-bit Delta-Sigma DWG can cost-effectively provide the same resolution as a 16-bit or greater digital-to-analog converter (DAC) DWG. These results provide the promise of low-cost diverse waveform generation capability in future high-performance Navy radar systems.
DTIC
Ultrahigh Frequencies; Waveforms

20070005296 Air Force Research Lab., Wright-Patterson AFB, OH USA
Magnetization Losses in Multifilament Coated Superconductors (Postprint)
Levin, G A; Barnes, P N; Amemiya, N; Kasai, S; Yoda, K; Jiang, Z; Aug 2006; 5 pp.; In English
Contract(s)/Grant(s): AOARD-03-4031; Proj-3145
Report No.(s): AD-A459915; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459915; Avail.: CASI: A01, Hardcopy

We report the results of a study of the magnetization losses in experimental multifilament, as well as control (uniform) coated superconductors exposed to time-varying magnetic fields of various frequencies. Both the hysteresis loss, proportional to the sweep rate of the applied magnetic field, and the coupling loss, proportional to the square of the sweep rate, have been observed. A scaling is found that allows us to quantify each of these contributions and extrapolate the results of the experiment beyond the envelope of accessible field amplitude and frequency. The combined loss in the multifilament conductor is reduced

by about 90% in comparison with the uniform conductor at full field penetration at a sweep rate as high as 3 T/s.
DTIC
Coatings; Losses; Magnetization; Superconductors (Materials)

20070005328 California Inst. of Tech., Pasadena, CA USA
Control of Electric Field Domain Formation in Multiquantum Well Structures
Shakouri, A; Grave, I; Xu, Y; Ghaffari, A; Yariv, A; Jun 9, 1993; 4 pp.; In English
Report No.(s): AD-A459977; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459977; Avail.: CASI: A01, Hardcopy

The formation of electric field domains (EFD) was first observed in bulk GaAs and is mostly known as the cause of Gunn oscillations. It is explained in terms of the negative differential resistance (NDR) which occurs because of the electron transfer from the r to the X or L valleys. Esaki and Chang2 first observed the formation of static EFDs in multiquantum wells (MQW); this phenomenon was attributed to the NDR which arises due to sequential resonant tunneling (SRT) between subbands in adjacent wells.3-6
DTIC
Electric Fields; Quantum Wells

20070005395 South Carolina Univ., Columbia, SC USA
Crack Growth and Stress Intensity Prediction Techniques. Delivery Order 0027-1: Mixed Mode Failure Criteria
Sutton, Michael A; Deng, Xiaomin; Reynolds, Anthony; Mar 2006; 126 pp.; In English
Contract(s)/Grant(s): F33615-98-D-3210-0027; Proj-A02P
Report No.(s): AD-A460082; No Copyright; Avail.: CASI: A07, Hardcopy

The challenges of designing modern aircraft continue to drive the development of more advanced analytical tools; often these more advanced analytical tools themselves require development of other enabling technologies such as powerful computers and associated software. The primary historical objective of this project was to develop the theoretical foundation for the development of a continuum-based, general stable crack extension criterion in ductile materials.
DTIC
Crack Propagation; Ductility; Failure; Prediction Analysis Techniques; Stress Intensity Factors

20070005625 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Direct Space Charge Effects on the ILC Damping Rings: Task Force Report
Venturini, M.; Feb. 2006; 27 pp.; In English
Report No.(s): DE2006-889308; LBNL-59511; No Copyright; Avail.: National Technical Information Service (NTIS)

In 2005 a global effort was initiated to conduct studies for a baseline recommendation for the various components of the International Linear Collider (ILC). Work for the damping rings was subdivided in a number of tasks. This Report contains the contribution to this effort by the Authors as Coordinators of the Task Force on space charge. (A slightly reduced version of this document can also be found as part of the Configuration Studies and Recommendations for the ILC Damping Rings, Edts. A. Wolski, et al., LBNL-Report-59449.) The studies documented in this Report were carried out for several of the reference lattices considered for the baseline recommendation. Space charge effects were found to be quite noticeable in the lattices with the longest circumference. Although it does not appear that they could prevent operation of any machine having such lattices they do favor a choice of a ring design with shorter (6km) circumference at 5 GeV.
NTIS
Damping; Space Charge

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*.

20070003584 NASA Langley Research Center, Hampton, VA, USA
MEMS Based Acoustic Array
Sheplak, Mark, Inventor; Nishida, Toshikaza, Inventor; Humphreys, William M., Inventor; Arnold, David P., Inventor; August 15, 2006; 26 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 28 Nov. 2001; US-Patent-7,092,539; US-Patent-Appl-SN-997113; NASA-Case-LAR-16231-1; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003584; Avail.: CASI: A03, Hardcopy

Embodiments of the present invention described and shown in the specification aid drawings include a combination responsive to an acoustic wave that can be utilized as a dynamic pressure sensor. In one embodiment of the present invention, the combination has a substrate having a first surface and an opposite second surface, a microphone positioned on the first surface of the substrate and having an input and a first output and a second output, wherein the input receives a biased voltage, and the microphone generates an output signal responsive to the acoustic wave between the first output and the second output. The combination further has an amplifier positioned on the first surface of the substrate and having a first input and a second input and an output, wherein the first input of the amplifier is electrically coupled to the first output of the microphone and the second input of the amplifier is electrically coupled to the second output of the microphone for receiving the output sinual from the microphone. The amplifier is spaced from the microphone with a separation smaller than 0.5 mm.

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

Microelectromechanical Systems; Acoustics; Microphones; Arrays

20070003638 Massachusetts Inst. of Tech., Cambridge, MA USA

Acoustic Measurements for Speaker Recognition

Sep 1969; 105 pp.; In English

Report No.(s): AD-A459696; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Acoustic Measurement; Speech Recognition

20070003739 Lawrence Livermore National Lab., Livermore, CA USA

Performance, Thermal, and Vibration Qualification Testing of Zetec Acoustic Transducers, Model Z0002659-2, Sondicator Probes

Jacobson, G.; Gemberling, S.; Lavietes, A.; Mar. 13, 2006; 50 pp.; In English

Report No.(s): DE2006-888621; UCRL-TR-219738; No Copyright; Avail.: National Technical Information Service (NTIS)

This report is a result of Qualification Test Plan No.001 prepared by Anthony Lavietes. The Qualification Test Plan outlines a list of requirements for thermal and vibrational testing of Zetac's Z0002659-2 Sondicator Probe acoustic transducers (hereafter called 'transducers'). The Zetec transducers are used in a system that employs an array of 7 acoustic transducers. Qualification testing of these transducers was required since they are a modified version of a standard catalog item from the manufacturer. This report documents the thermal, vibrational, and performance testing that was performed on a sampling of these transducers in order to qualify them for flight. A total of 14 transducers were tested. All 14 passed qualification testing with no failures.

NTIS

Acoustics; Electroacoustic Transducers; Performance Tests; Sound Transducers; Transducers; Vibration

20070003905 Massachusetts Inst. of Tech., Cambridge, MA USA

Simultaneous Linearized Inversion of Velocity and Density Profiles for Multidimensional Acoustic Media

May 1989; 43 pp.; In English

Contract(s)/Grant(s): AFOSR-85-0227; ECS-87-00903

Report No.(s): AD-A459643; LIDS-P-1874; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Inversions; Velocity Distribution; Acoustics

20070003908 Washington State Univ., Pullman, WA USA

Scattering of Evanescent Acoustic Waves by Regular and Irregular Objects

Dec 2006; 19 pp.; In English

Contract(s)/Grant(s): N00014-03-1-0585

Report No.(s): AD-A459639; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Acoustic Scattering; Evanescent Waves; Sound Waves; Wave Dispersion

20070004878 Massachusetts Inst. of Tech., Cambridge, MA USA

Parsimony and Wavelet Methods for Denoising

Apr 1998; 6 pp.; In English

Contract(s)/Grant(s): F49620-98-1-0349

Report No.(s): AD-A459557; LIDS-P-2416; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Wavelet Analysis; Methodology

20070004905 NASA Glenn Research Center, Cleveland, OH, USA

Rotating Rake Mode Measurements Over Passive Treatment in a Ducted Fan

Sutliff, Daniel L.; December 2006; 19 pp.; In English; 35th International Congress and Exposition on Noise Control Engineering (INTER-Noise 2006), 3-6 Dec. 2006, Honolulu, HI, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 561581.02.08.03.18.03

Report No.(s): NASA/TM-2006-214493; IN06-558; E-15785; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004905; Avail.: CASI: A03, Hardcopy

The NASA Glenn Research Center s Rotating Rake mode measurement system has been successful in measuring the modal content propagating in hardwall ducts. This paper proposes an extension of the Rotating Rake measurement and analysis technique to treated sections by developing basis functions based on wall impedance boundary conditions for flow conditions (i.e., constant duct area and Mach number) where the closed form analytical solution exists. Analytical equations developed to estimate mode power are incorporated. This method is verified by decomposing and analyzing radial pressure profiles generated numerically by the Eversman propagation code. Several modes, frequencies and impedances are evaluated. Data from a low-speed ducted fan with several different impedance conditions was acquired and reduced to determine the best fit to the data. Using the impedance boundary conditions result in better mode measurement solutions.

Author

Ducted Fans; Aeroacoustics; Rotation; Low Speed; Impedance; Pressure Distribution

20070004978 National Renewable Energy Lab., Golden, CO USA

International Electrotechnical Commission Standard IEC 61400-11 and Other Procedures. Acoustic Noise Measurement Techniques

Huskey, A.; Jun. 2006; 13 pp.; In English

Report No.(s): DE2006-889338; NREL/PR-500-39978; No Copyright; Avail.: National Technical Information Service (NTIS)

This document is a presentation on acoustic noise measurement techniques for wind turbines.

NTIS

Acoustic Measurement; Noise (Sound); Noise Measurement; Wind Turbines

20070005324 Massachusetts Inst. of Tech., Cambridge, MA USA

A Wavelet Packet Approach to Transient Signal Classification

Learned, Rachel E; Willsky, Alan S; Sep 27, 1993; 36 pp.; In English

Contract(s)/Grant(s): AFOSR-92-J-0002

Report No.(s): AD-A459970; MIT-LIDS-P-2199; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459970; Avail.: CASI: A03, Hardcopy

Time-frequency transforms, including wavelet and wavelet packet transforms, are generally acknowledged to be useful for studying non-stationary phenomena and, in particular, have been shown or claimed to be of value in the detection and characterization of transient signals. In many applications time-frequency transforms are simply employed as a visual aid to be used for signal display. Although there have been several studies reported in the literature, there is still considerable work to be done investigating the utility of wavelet and wavelet packet time-frequency transforms for automatic transient signal classification. In this paper, we contribute to this ongoing investigation by exploring the feasibility of applying the wavelet packet transform to automatic detection and classification of a specific set of transient signals in background noise. In particular, a noncoherent wavelet-packet-based algorithm specific to the detection and classification of underwater acoustic signals generated by snapping shrimp and sperm whale clicks is proposed. We develop a systematic feature extraction process which exploits signal class differences in the wavelet packet transform coefficients. The wavelet-packet-based features

obtained by our method for the biologically generated underwater acoustic signals yield excellent classification results when used as input for a neural network and a nearest neighbor rule.
DTIC
Classifications; Signal Transmission; Sound Waves; Underwater Acoustics; Wavelet Analysis

20070005440 Sytronics, Inc., Dayton, OH USA
The Effect of Microphone Placement on Localization Accuracy with Electronic Pass-Through Earplugs
Brungart, Douglas S; Eades, Cynthia S; Simpson, Brian D; Kordik, Alex J; Sep 2006; 6 pp.; In English
Contract(s)/Grant(s): Proj-7184
Report No.(s): AD-A460146; No Copyright; Avail.: CASI: A02, Hardcopy

Many audio applications make use of electronic pass-through listening devices that intercept the signals entering a listener's ears and electronically process them in real time. An important issue in designing such devices is ensuring that they maintain the listener's natural ability to localize sound sources. Previous research suggests that optimal localization requires a completely-in-the-canal (CIC) design with a system bandwidth of at least 13 kHz. However, most practical designs have to make engineering compromises in terms of bandwidth and/or microphone placement that cause some degradation in localization performance. This paper compares open-ear localization to localization with seven different pass-through devices: five custom-molded earplugs with different microphone configurations; a CIC hearing aid; and an electronic earmuff. The results show that earplugs interfere substantially less with localization than earmuffs, but that the frequency response has a larger impact on performance than does physical configuration in earplug systems that are bandlimited to frequencies below 6 kHz.
DTIC
Ear Protectors; Microphones; Position (Location)

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*.

20070005331 California Inst. of Tech., Pasadena, CA USA
Direct Measurement of Population-Induced Broadening of Quantum Well Intersubband Transitions
Xu, Yuanjian; Almogy, Gilad; O'Brien, John; Shakouri, Ali; Xu, Weihua; Salvatore, Randal A; Yariv, Amnon; Aug 11, 1997; 4 pp.; In English
Report No.(s): AD-A459983; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459983; Avail.: CASI: A01, Hardcopy

In the single band model, also known as the parabolic effective mass model, intersubband transitions in quantum wells (QWs) are discrete. In practice, electron-electron interaction, QW width nonuniformity, electron interactions with rough interfaces and with impurities and their enhancement by electric fields, and the optical and acoustic phonons contribute to the experimentally observed linewidth of intersubband transition in QWs.1-5 There have been quite a few theoretical reports to explain the experimental observation,1-8 and, there has been controversy over the contribution of population density to the intersubband broadening. Bandara et al.6,7 predicted that the dependence of the exchange interaction on the in-plane momentum (k||) could contribute a substantial fraction of experimentally observed linewidths. Zaluzny,8 on the other hand, claimed that the k|| dependence is offset by the depolarization and excitonlike manybody effects. In this letter, we report on the experimental study of the dependence of intersubband transition broadening on electron population using a structure consisting of 50 periods of an asymmetric coupled double QWs (ACDQWs). External applied bias was used to shift the population between the coupled QWs whose absorption was measured with a monolithically integrated QW infrared photodetector (QWIP) directly on the ACDQW structure.9,10
DTIC
Electron Transitions; Populations; Quantum Theory; Quantum Wells

20070005405 Edgewood Research Development and Engineering Center, Aberdeen Proving Ground, MD USA
Target Detection in Multispectral Images using the Spectral Co-Occurrence Matrix and Entropy Thresholding
ALthouse, Mark L; Chang, Chein-I; Jan 26, 1995; 15 pp.; In English
Report No.(s): AD-A460095; No Copyright; Avail.: CASI: A03, Hardcopy

Relative entropy thresholding techniques have been used for segmentation of objects from background in gray-level images. These techniques are related to entropy-based segmentations computed for the statistics of a spatial co-occurrence matrix. For detection of spectrally active targets such as chemical vapor clouds in multispectral or hyperspectral imagery, a spectral co-occurrence matrix is employed. Using the entropy of various regions of the matrix, thresholds can be derived that will segment an image family based on the spectral characteristics of the intended target. Experiments are presented that show the detection of a chemical vapor cloud in multispectral thermal imagery. Several manners of dividing the co-occurrence matrix into regions are explored. Thresholds are determined on both a local and global basis and compared. Locally generated thresholds are treated as a distribution and separated into classes. The point of class separation is used as a global threshold with improved results.
DTIC
Detection; Entropy; Spectra; Target Acquisition

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*.

20070003582 NASA Marshall Space Flight Center, Huntsville, AL, USA
Radio-Frequency Driven Dielectric Heaters for Non-Nuclear Testing in Nuclear Core Development
Sims, William Herbert, III, Inventor; Godfroy, Thomas J., Inventor; Bitteker, Leo, Inventor; August 22, 2006; 14 pp.; In English; Original contains black and white illustrations
Patent Info.: Filed 13 Sep. 2004; US-Patent-7,095,000; US-Patent-Appl-SN-943827; NASA-Case-MSF-31823-1; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003582; Avail.: CASI: A03, Hardcopy

Apparatus and methods are provided through which a radiofrequency dielectric heater has a cylindrical form factor, a variable thermal energy deposition through variations in geometry and composition of a dielectric, and/or has a thermally isolated power input.
Official Gazette of the U.S. Patent and Trademark Office
Dielectrics; Heaters; Radio Frequencies; Nuclear Energy

20070004674 Oak Ridge National Lab., TN USA
Scaling of Thermal-Hydraulic Experiments for a Space Ranking Cycle and Selection of a Preconceptual Scaled Experiment Design
Sulfredge, C. D.; Yoder, G. L.; Sep. 30, 2005; 60 pp.; In English
Report No.(s): DE2006-885976; ORNL/TM-2005/213; No Copyright; Avail.: National Technical Information Service (NTIS)

To assist with the development of a space-based Rankine cycle power system using liquid potassium as the working fluid, a study has been conducted on possible scaled experiments with simulant fluids. This report will consider several possible working fluids and describe a scaling methodology to achieve thermal-hydraulic similarity between an actual potassium system and scaled representations of the Rankine cycle boiler or condenser. The most practical scaling approach examined is based on the selection of perfluorohexane (FC-72) as the simulant. Using the scaling methodology, a series of possible solutions have been calculated for the FC-72 boiler and condenser. The possible scaled systems will then be compared and preconceptual specifications and drawings given for the most promising design. The preconceptual design concept will also include integrating the scaled boiler and scaled condenser into a single experimental loop. All the preconceptual system specifications appear practical from a fabrication and experimental standpoint, but further work will be needed to arrive at a final experiment design.
NTIS
Experiment Design; Rankine Cycle; Fabrication; Hydraulics

20070004678 Oak Ridge National Lab., TN USA
Status of Physics and Safety Analyses for the Liquid Salt Cooled Very High Temperature Reactor (LS-VHTR)
Ingersoll, D. T.; Dec. 2005; 104 pp.; In English
Report No.(s): DE2006-885991; No Copyright; Avail.: National Technical Information Service (NTIS)

A study has been completed to develop a new baseline core design for the liquid-salt-cooled very high-temperature reactor (LS-VHTR) that is better optimized for liquid coolant and that satisfies the top-level operational and safety targets, including strong passive safety performance, acceptable fuel cycle parameters, and favorable core reactivity response to coolant voiding. Three organizations participated in the study: Oak Ridge National Laboratory (ORNL), Idaho National Laboratory (INL), and Argonne National Laboratory (ANL). Although the intent was to generate a new reference LS-VHTR core design, the emphasis was on performing parametric studies of the many variables that constitute a design. The results of the parametric studies not only provide the basis for choosing the optimum balance of design options, they also provide a valuable understanding of the fundamental behavior of the core, which will be the basis of future design trade-off studies.
NTIS
Coolants; High Temperature; Nuclear Reactors; Safety

20070004834 Defense Science Board, Washington, DC USA
Report of the Defense Science Board Task Force on Nuclear Capabilities Report Summary
Dec 2006; 59 pp.; In English
Report No.(s): AD-A459527; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available
Defense Program; Nuclear Weapons

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*.

20070003545 Naval Research Lab., Washington, DC USA
An Inductively Coupled Goniometer for Wide-Aperture DF Arrays
Aug 12, 1958; 47 pp.; In English
Report No.(s): AD-A459667; NRL-MR-832; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Apertures; Deuterium Fluorides; Goniometers

20070003556 NASA Stennis Space Center, Stennis Space Center, MS, USA
Fiber Optic Raman Sensor to Monitor Concentration Ratio of Nitrogen and Oxygen in a Cryogenic Mixture
Tiwari, Vidhu S.; Kalluru, Rajamohan R.; Yueh, Fang-Yu; Singh, Jagdish P.; SaintCyr, William; [2007]; 21 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): NNS04AA34C
Report No.(s): SSTI-2200-0079-FLUIDS; Copyright; Avail.: CASI: A03, Hardcopy

A spontaneous Raman scattering optical fiber sensor is developed for a specific need of NASA/SSC for long-term detection and monitoring of the quality of liquid oxygen (LOX) in the delivery line during ground testing of rocket engines. The sensor performance was tested in the laboratory and with different excitation light sources. To evaluate the sensor performance with different excitation light sources for the LOX quality application, we have used the various mixtures of liquid oxygen and liquid nitrogen as samples. The study of the sensor performance shows that this sensor offers a great deal of flexibility and provides a cost effective solution for the application. However, an improved system response time is needed for the real-time, quantitative monitoring of the quality of cryogenic fluids in harsh environment.
Author
Cryogenic Fluids; Fiber Optics; Liquid Nitrogen; Liquid Oxygen; Raman Spectra; Mixtures; Sensors

20070003675 Massachusetts Inst. of Tech., Cambridge, MA USA
People Recognition in Image Sequences by Supervised Learning
Jun 2000; 14 pp.; In English
Contract(s)/Grant(s): N00014-93-1-3085; N00014-95-1-0600
Report No.(s): AD-A459706; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Sequencing; Images; Pattern Recognition; Education

20070003711 Pennsylvania State Univ., University Park, PA USA
Extreme Nonlinear Optics With Liquid Crystals
Oct 31, 2006; 24 pp.; In English
Contract(s)/Grant(s): DAAD19-03-1-0234
Report No.(s): AD-A459438; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Liquid Crystals; Nonlinear Optics

20070003716 University of Southern California, Marina del Rey, CA USA
Postproduction Re-Illumination of Live Action Using Time-Multiplexed Lighting
Jun 14, 2004; 5 pp.; In English
Contract(s)/Grant(s): DAAD19-99-D-0046
Report No.(s): AD-A459343; ICT-TR-05-2004; No Copyright; Avail.: CASI: A01, Hardcopy

No abstract available

Illuminating; Multiplexing

20070003743 Lawrence Livermore National Lab., Livermore, CA USA
Initial Demonstration of Mercury Wavefront Correction System
Liao, Z. M.; Feb. 07, 2006; 14 pp.; In English
Report No.(s): DE2006-888617; UCRL-TR-218721; No Copyright; Avail.: National Technical Information Service (NTIS)

High average power operation of the Mercury Laser induces dynamic aberrations to the laser beam wavefront. Analysis of recent data indicates that up to 4 waves of low order aberration (mainly focus error or power, with spatial resolution \h 0.5 cm(sup -1)) could be expected at each pass. Because of the magnitude of the wavefront error, the logical position is to place a deformable mirror (DM) at the M11 position, where the DM will correct the beam between passes 1 & 2 and 3 & 4. Currently, there are only two established commercial vendors offering complete adaptive optic (AO) systems that can accommodate the Mercury beam size (45 x 75 mm) which are compatible with high damage threshold coatings. Xinetics (MA, USA) offers a complete AO system along with a Shack-Hartmann wavefront sensor. The Xinetics DM is based on lead magnesium niobate (PMN) technology. A number of US aerospace firms as well as NIF use Xinetics PMN technology for their DMs. Phasics (Paris, France) offers a complete AO solution with its proprietary SID-4, a four-way shearing interferometric wavefront sensor capable of high resolution (over 100 x 100 sampling points). The Phasics system includes a bimorph deformable mirror from Night-n-Opt (Moscow, Russia) that uses lead zirconate titanate (PZT) technology. Various high power laser laboratories around the world such as LULI (France), HELEN (UK), and GEKKO (Japan) are using the PZT-based bimorph DM in their system. While both DM technologies are equivalent and have been deployed in high-energy laser systems, the PZT based bimorph DM offers two distinct features that makes it more attractive for high average power laser systems. The bimorph DM uses two layers of PZT actuators with the outer layer acting as power correctors, capable of correcting up to 20 waves of power. The Xinetics DM offers a maximum stroke of 4 waves. In addition, Night-N-Opt has also designed a water-cooled DM with a silicon based substrate (as opposed to a glass substrate) specifically for high average power laser systems--an option that is currently not available for PMN based DMs.
NTIS

Lasers; Mercury (Metal); Spatial Resolution; Wave Fronts

20070004819 Maryland Univ., College Park, MD USA
Fiber Optic Detection of Action Potentials in Axons
Dec 2006; 9 pp.; In English
Contract(s)/Grant(s): W911NF-06-1-0041
Report No.(s): AD-A459507; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Axons; Fiber Optics; Detection

20070004871 California Univ., Santa Barbara, CA USA
Integrated Cooling for Optoelectronic Devices
Jan 2000; 8 pp.; In English
Report No.(s): AD-A459476; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Cooling; Optoelectronic Devices; Integrated Optics

20070004942 Lawrence Livermore National Lab., Livermore, CA USA

Method of Defining Features on Materials with a Femtosecond Laser

Roos, E. V.; Roeske, F.; Lee, R. S.; Benterou, J. L.; 7 Nov 03; 7 pp.; In English

Contract(s)/Grant(s): DE-W-7405-ENG-48

Patent Info.: Filed Filed 7 Nov 03; US-Patent-Appl-SN-10-704 459

Report No.(s): PB2007-100886; No Copyright; Avail.: CASI: A02, Hardcopy

The invention relates to a pulsed laser ablation method of metals and/or dielectric films from the surface of a wafer, printed circuit board or a hybrid substrate. By utilizing a high-energy ultra-short pulses of laser light, such a method can be used to manufacture electronic circuits and/or electromechanical assemblies without affecting the material adjacent to the ablation zone.

NTIS

Lasers; Patent Applications

20070004944 Chicago Univ., Chicago, IL USA

Apparatus for Using Optical Tweezers to Manipulate Materials

Grier, D. G.; Dufresne, E. R.; Curtis, J. E.; Koss, B. A.; 10 Dec 04; 18 pp.; In English

Contract(s)/Grant(s): NSF-DMR-9730189; NSF-DMR-9808595

Patent Info.: Filed Filed 10 Dec 04; US-Patent-Appl-SN-11-010 004

Report No.(s): PB2007-100887; No Copyright; Avail.: CASI: A03, Hardcopy

A method and apparatus for control of optical trap arrays and formation of particle arrays using light that is in the visible portion of the spectrum. The method and apparatus provides a laser and a time variable diffractive optical element to allow dynamic control of optical trap arrays and consequent control of particle arrays and also the ability to manipulate singular objects using a plurality of optical traps. By avoiding wavelengths associated with strong absorption in the underlying material, creating optical traps with a continuous-wave laser, optimizing the efficiency of individual traps, and trapping extended samples at multiple points, the rate of deleterious nonlinear optical processes can be minimized.

NTIS

Optical Equipment; Optical Materials; Patent Applications

20070004951 Woodard, Emhardt, Moriarty, McNett and Henry, LLP, Indianapolis, IN, USA

Laser-Based Spectroscopic Detection Techniques

Harper, W. W.; 10 Sep 04; 15 pp.; In English

Contract(s)/Grant(s): DE-AC0676RLO1831

Patent Info.: Filed Filed 10 Sep 04; US-Patent-Appl-SN-10-938 967

Report No.(s): PB2007-100890; No Copyright; Avail.: CASI: A03, Hardcopy

One embodiment of the present invention includes: a modulated laser light source to transmit an interrogation light beam to a region including a substance for spectroscopic evaluation, a detector responsive to modulated light from the region to provide a corresponding modulated signal, and a signal processing subsystem responsive to the modulated signal to generate a spectroscopic absorption peak representation. This subsystem also estimates absorbance based on a derivative form of an absorption peak and a residual amplitude modulation level corresponding to the absorption peak.

NTIS

Detection; Lasers; Optical Measurement; Patent Applications; Spectroscopy

20070004997 Lawrence Livermore National Lab., Livermore, CA USA

Directed Energy System for Defeat of Improvised Explosive Devices and Landmines

Boley, C.; Fochs, S.; Parker, J.; Rotter, M.; Rubenchik, A.; Mar. 27, 2006; 16 pp.; In English

Report No.(s): DE2006-889443; UCRL-PROC-220154; No Copyright; Avail.: National Technical Information Service (NTIS)

We describe a laser system, built in our laboratory at LLNL, that has near-term, effective applications in exposing and neutralizing improvised explosive devices and landmines. We discuss experiments with this laser, demonstrating excavation capabilities and relevant material interactions. Model results are also described.

NTIS

Explosive Devices; Explosives; Mines (Ordnance)

20070005009 Naval Undersea Warfare Center, Newport, RI, USA

Natural Fiber Spin Reflectometer Providing a Virtual Differential Signal Sensing Array Capability

Payton, R. M.; 7 Feb 05; 35 pp.; In English

Patent Info.: Filed Filed 7 Feb 05; US-Patent-Appl-SN-11-056-631

Report No.(s): PB2007-103897; No Copyright; Avail.: CASI: A03, Hardcopy

A CW lightwave modulated by a continuously reiterated pseudorandom (PN) code sequence is launched into an end of a span of ordinary optical fiber cable. Portions of the launched lightwave back propagate to the launch end from a continuum of locations along the span because of innate fiber properties including Rayleigh scattering. This is picked off the launch end and heterodyned producing a r.f. beat signal. The r.f. beat signal is processed by a plurality (which can be thousands) of correlator pseudonoise code sequence demodulation and phase demodulator units operated in different delay time relationships to the timing base of the reiterated modulation sequences. Pairs of outputs of the units are connected to respective substractor circuits, each providing a signal representative of a differential signal between acoustic, or other forms of, signals incident the bounds of virtual increments of the span.

NTIS

Detection; Reflectometers; Sensors; Signal Detectors

20070005064 Grigoryan (Vladimir S.), Eldridge, MD, USA

Optical Regenerative Amplifier for Binary Phase Shift-Keying Signals

Grigoryan, V.; Kumar, P.; 26 Feb 06; 10 pp.; In English

Contract(s)/Grant(s): DARPA-AFRL-F30602-01-0528

Patent Info.: Filed Filed 26 Feb 06; US-Patent-Appl-SN-11-307 868

Report No.(s): PB2007-101286; No Copyright; Avail.: CASI: A02, Hardcopy

There is provided an optical regenerative amplifier for regenerative amplification of a binary phase shift-keying (BPSK) sequence of optical signals having a predetermined time slot between any adjacent signals. The optical regenerative amplifier comprises a first delay interferometer, wherein an input sequence of BPSK signals is split between two arms of an interferometer, a relative delay by the time slot between the adjacent signals is introduced in one of the arms of the interferometer to produce two mutually anti-symmetric trains of amplitude shift-keying (ASK) signals; a discriminative limiting amplifier to amplify the said two trains of anti-symmetric ASK signals, wherein the amplification for the spaces is smaller compared to the amplification for the marks and the amplification for the marks is limiting; and a second delay interferometer, wherein the said two trains of anti-symmetric ASK signals are recombined, delayed, and interfered to reproduce a regeneratively amplified BPSK sequence of signals and to separate noise from the signals.

NTIS

Binary Phase Shift Keying; Light Amplifiers; Optical Communication; Patent Applications

20070005073 Pacific Northwest National Lab., Richland, WA, USA

FY 2005 Quantum Cascade Laser Alignment System. Final Report

Myers, T. L.; Cannon, B. D.; Wojcik, M. D.; Broocks, B. T.; Stewart, T. L.; Dec. 2005; 52 pp.; In English

Report No.(s): DE2006-889069; PNNL-15600; No Copyright; Avail.: National Technical Information Service (NTIS)

The Alignment Lasers Task of Pacific Northwest National Laboratory’s (PNNL’s) Remote Spectroscopy Project (Project PL211I) is a co-funded project between DOE NA-22 and a Classified Client. This project, which began in the second half of FY03, involved building and delivering a Quantum Cascade (QC) Laser Alignment System to be used for testing the pupil alignment of an infrared sensor by measuring the response from four pairs of diametrically opposed QC lasers. PNNL delivered the system in FY04 and provided technical assistance in FY05 culminating into a successful demonstration of the system. This project evolved from the Laser Development Task of PL211I, which is involved in developing novel laser technology to support development of advanced chemical sensors for detecting the proliferation of nuclear weapons. The laser systems are based on quantum cascade (QC) lasers, a new semiconductor source in the infrared. QC lasers can be tailored to emit light throughout the infrared region (3.5 17 im) and have high output power and stability. Thus, these lasers provide an infrared source with superb power and spectral stability enabling them to be used for applications such as alignment and calibration in addition to chemical sensing. The QC Laser Alignment System consists of four Alignment Source Assemblies (ASAs) with two QC lasers on each ASA and a computer control system with graphical user interface (GUI) for simple, reliable operation. Each ASA has a temperature sensor and heater for controlling the temperature to enable stable and reproducible output power. In addition, each laser has an on-board photodetector to measure the output power from the rear facet. The computer control system monitors the compliance voltage across the QC laser, the temperature, the current, and the signal from the optical detectors to ensure the system is operating within the specified tolerances. The technical achievements

for this project include 1) assembly and construction of the QC Laser Alignment System, 2) far-field characterization of all eight QC lasers, 3) delivery of the QC Laser Alignment System to the Using subcontractor in September 2004, and 4) successful demonstration of the QC Laser Alignment System in March 2005.
NTIS
Alignment; Lasers; Nuclear Weapons; Quantum Cascade Lasers

20070005079 Holland and Knight, Miami, FL, USA
All-Optical Controllable Photonic Switch
Li, D.; 9 Mar 05; 12 pp.; In English
Contract(s)/Grant(s): DASG60-03-C-0021
Patent Info.: Filed Filed 9 Mar 05; US-Patent-Appl-SN-11-075 776
Report No.(s): PB2007-101284; No Copyright; Avail.: CASI: A03, Hardcopy

A photonic switch matrix is disclosed. The photonic switch matrix includes a first pair of power splitters, each power splitter including one input and two output ports and a second pair of power splitters, each power splitter including two input ports and one output port. The photonic switch matrix further includes four optical fibers doped with gain controllable substances under light pumping, the four optical fibers connecting the first pair and the second pair of power splitters, wherein each input port of the second pair of power splitters is connected to an output port of the first pair of power splitters. The photonic switch matrix further includes four multiplexers, each multiplexer coupled with one of the four optical fibers, and at least one light pump connected to each multiplexer, wherein light pumped into a multiplexer defines an optical path of the photonic switch matrix.
NTIS
Matrices (Circuits); Optical Switching; Switching Circuits

20070005109 Lawrence Livermore National Lab., Livermore, CA USA
Multi Dimensional Investigation of Laser Conditioning in KDP and DKDP Crystals
DeMange, P.; Negres, R. A.; Carr, C. W.; Radousky, H. B.; Demos, S. G.; Nov. 04, 2005; 16 pp.; In English
Report No.(s): DE2006-886671; No Copyright; Avail.: Department of Energy Information Bridge

We present a multi-parametric experimental investigation of laser conditioning efficiency and behavior in KDP and DKDP crystals as a function of laser wavelength, fluence, number of pulses, and conditioning protocol. Our results expose complex behaviors associated with damage initiation and conditioning at different wavelengths that provide a major step towards revealing the underlying physics. In addition, we reveal the key parameters for optimal improvement to the damage performance from laser conditioning.
NTIS
Crystals; Lasers

20070005123 Lawrence Livermore National Lab., Livermore, CA USA
Wave Based Inversion and Imaging for the Optical Quadrature Microscope
Lehman, S. K.; Nov. 14, 2005; 24 pp.; In English
Report No.(s): DE2006-886667; No Copyright; Avail.: Department of Energy Information Bridge

The Center for Subsurface Sensing & Imaging Systems (CenSSIS) Optical Quadrature Microscope (OQM) is a narrow band visible light microscope capable of measuring both amplitude and phase of a scattered field. We develop a diffraction tomography, that is, wavebased, scattered field inversion and imaging algorithm, for reconstructing the refractive index of the scattering object.
NTIS
Imaging Techniques; Inversions; Microscopes; Optical Microscopes; Quadratures; Refractivity

20070005137 Lawrence Livermore National Lab., Livermore, CA USA
In-vivo Imaging of the Photoreceptor Mosaic in Retinal Dystrophies and Correlation with Visual Function
Choi, S.; Doble, N.; Hardy, J.; Jones, S.; Keltner, J.; Oct. 27, 2005; 44 pp.; In English
Report No.(s): DE2006-886664; No Copyright; Avail.: Department of Energy Information Bridge

AO fundus photography is a reliable technique for assessing and quantifying the changes in the photoreceptor layer as

disease progresses. Furthermore, this technique can be useful in cases where visual function tests give borderline or ambiguous results, as it allows visualization of individual photoreceptors.
NTIS
Diseases; Imaging Techniques; In Vivo Methods and Tests; Mosaics; Photoreceptors; Retina

20070005153 Sandia National Labs., Albuquerque, NM USA
Investigation of Temporal Contrast Effects in Femtosecond Pulse Laser Micromachining of Metals
Palmer, J. A.; Campbell, B. R.; Jun. 2006; 28 pp.; In English
Report No.(s): DE2006-887259; SAND2006-2664; No Copyright; Avail.: Department of Energy Information Bridge

Femtosecond pulse laser drilling has evolved to become a preferred process for selective (maskless) micromachining in a variety of materials, including metals, polymers, semiconductors, ceramics, and living tissue. Manufacturers of state-of-the-art femtosecond laser systems advertise the inherent advantage of micromachining with ultra short pulses: the absence of a heat affected zone. In the ideal case, this leads to micro and nano scale features without distortion due to melt or recast. However, recent studies have shown that this is limited to the low fluence regime in many cases. High dynamic range autocorrelation studies were performed on two commercial Ti:sapphire femtosecond laser systems to investigate the possible presence of a nanosecond pedestal in the femtosecond pulse produced by chirped pulse amplification. If confirmed, nanosecond temporal phenomena may explain many of the thermal effects witnessed in high fluence micromachining. The material removal rate was measured in addition to feature morphology observations for percussion micro drilling of metal substrates in vacuum and ambient environments. Trials were repeated with proposed corrective optics installed, including a variable aperture and a nonlinear frequency doubling crystal. Results were compared. Although the investigation of nanosecond temporal phenomena is ongoing, early results have confirmed published accounts of higher removal rates in a vacuum environment.
NTIS
Laser Drilling; Laser Machining; Metals; Pulsed Lasers

20070005154 Lawrence Livermore National Lab., Livermore, CA USA
Summary of Recent Damage-Initiation Experiments on KDP Crystals
Carr, C. W.; Feit, M. D.; Rubenchik, A. M.; Trenholme, J. B.; Spaeth, M. L.; Nov. 08, 2005; 14 pp.; In English
Report No.(s): DE2006-887280; UCRL-PROC-216929; No Copyright; Avail.: Department of Energy Information Bridge

We summarize recent investigations of the density and morphology of bulk damage in KDP crystals as a function of pulse duration, temporal profile, wavelength, and energy fluence. As previously reported by Runkel et al.1, we also find that the size of bulk damage sites varies roughly linearly with pulse duration for pulses between 1 ns and 9 ns. However this trend no longer applies at pulse durations below 1 ns. Experiments measuring the damage density and size distribution as a function of wavelength confirm many previous works which indicated a strong dependence of damage density with wavelength. However, we also find that the size of damage sites is relatively insensitive to wavelength. Further we see damage due to Flat-In-Time (FIT) pulses has different pulse length and fluence dependence than Gaussian pulses. We demonstrate that a simple thermal diffusion model can account for observed differences in damage densities due to square and Gaussian temporally shaped pulses of equal fluence. Moreover, we show that the key laser parameter governing size of the bulk damage sites is the length of time the pulse remains above a specific intensity. The different dependences of damage density and damage site size on laser parameters suggest different absorption mechanisms early and late in the damaging pulse.
NTIS
Crack Initiation; Crystals; Lasers

20070005220 Massachusetts Inst. of Tech., Cambridge, MA USA
Direction Estimation of Pedestrian from Images
Simizu, Hiroaki; Poggio, Tomaso; Aug 2003; 13 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-00-1-0907; N00014-02-1-0915
Report No.(s): AD-A459729; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459729; Avail.: CASI: A03, Hardcopy

The capability of estimating the walking direction of people would be useful in many applications such as those involving autonomous cars and robots. We introduce an approach for estimating the walking direction of people from images, based on learning the correct classification of a still image by using SVMs. We find that the performance of the system can be improved by classifying each image of a walking sequence and combining the outputs of the classifier. Experiments were performed to

evaluate our system and estimate the trade-off between number of images in walking sequences and performance.
DTIC
Images; Walking

20070005260 Naval Research Lab., Washington, DC USA
Design Considerations for the Second-Generation NPOI Fringe Tracker and Science Beam Combiner
Zhang, Xiaolei; Armstrong, Tom; Restaino, Sergio; Mozurkewich, Dave; Dec 18, 2006; 30 pp.; In English
Report No.(s): AD-A459862; NRL/MR/7210--06-9018; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459862; Avail.: CASI: A03, Hardcopy

We describe the motivations for and the conceptual design of the second-generation back-end beam combiner and fringe tracker for the Navy Prototype Optical Interferometer. The new back end is expected to result in much-improved data quality and sensitivity compared to the existing back end. It will also enable the observation of geostationary satellites in the visible and near infrared regions of the spectrum.
DTIC
Interferometers; Optical Measurement

20070005478 Raytheon Integrated Defense Systems, Andover, MA USA
Transparent Yttria for IR Windows and Domes - Past and Present
Hogan, Patrick; Stefanik, Todd; Willingham, Charles; Gentilman, Richard; May 19, 2004; 65 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-02-C-0141; N00014-04-C-0100
Report No.(s): AD-A460289; No Copyright; Avail.: CASI: A04, Hardcopy

Yttria (Y2O3) has excellent optical performance through the full mid wavelength infrared (MWIR) atmospheric transmission band at both ambient and elevated temperatures. Current state-of-the-art yttria's thermomechanical properties are adequate for a number of IR window and dome applications, but only marginal for the most demanding missions. Although conventional yttria's strength and hardness are lower than the more durable but less transmitting MWIR materials (sapphire, ALON, spinel), its thermal shock performance is similar. In fact, 7 out of 7 flat yttria windows were successfully wind-tunnel tested under hypersonic conditions simulating representative surface-to-air interceptor missile flights. Recent renewed interest in yttria windows and domes has prompted efforts to enhance mechanical properties by producing materials with micron or nano-size grains. Three vendors were selected to provide nanoscale powders for testing and evaluation, and they were compared to a conventional yttria powder previously used to prepare transparent ceramic yttria. While all of the nanopowders evaluated had impurity levels that were too high to allow processing to full transparency, two were processed to full density and moderate transparency. Ultrasonic attenuation as a technique for measuring particle size distributions in slurries was explored and found to be an invaluable tool when processing colloidal suspensions of nanopowders. In this paper, the optical, thermal, and mechanical properties of conventional transparent yttria are reviewed and compared with other candidate MWIR window/dome materials. The status of on-going Navy-sponsored development of nano-grain yttria is also presented.
DTIC
Infrared Windows; Transparence; Yttrium Oxides

75
PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90\fAstrophysics*.

20070004768 Army Research Lab., Aberdeen Proving Ground, MD USA
Confocal Microscopy Studies for Plasma Surface Modified Films and Fibers
Dec 2006; 28 pp.; In English
Report No.(s): AD-A459768; ARL-TR-4004; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Microscopy; 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*.

20070004673 Oak Ridge National Lab., TN USA, Centre d'Etudes de Cadarache, Sante Paul lez Durance, France
Neutron Resonance Parameters of 238U and the Calculated Cross Sections from the Reich-Moore Analysis of Experimental Data in the Neutron Enrgy Range from O keV to 20 keV
Derrien, H.; Leal, L. C.; Larson, N. M.; Courcelle, A.; Nov. 2005; 94 pp.; In English
Report No.(s): DE2006-885973; ONRL/TM-2005/241; No Copyright; Avail.: Department of Energy Information Bridge

The neutron resonance parameters of (sup 238)U were obtained from a SAMMY analysis of high-resolution neutron transmission measurements and high-resolution capture cross section measurements performed at the Oak Ridge Electron Linear Accelerator (ORELA) in the years 1970-1990, and from more recent transmission and capture cross section measurements performed at the Geel Linear Accelerator (GELINA). Compared with previous evaluations, the energy range for this resonance analysis was extended from 10 to 20 keV, taking advantage of the high resolution of the most recent ORELA transmission measurements. The experimental database and the method of analysis are described in this report. The neutron transmissions and the capture cross sections calculated with the resonance parameters are compared with the experimental data. A description is given of the statistical properties of the resonance parameters and of the recommended values of the average parameters. The new evaluation results in a slight decrease of the effective capture resonance integral and improves the prediction of integral thermal benchmarks by 70 pcm to 200 pcm.
NTIS
Linear Accelerators; Neutrons; Particle Accelerators

20070004835 Illinois Univ. at Urbana-Champaign, Urbana, IL USA
Self-Assembled Colloidal Crystals for Photonic Applications and Its Outlook
Jan 2006; 6 pp.; In English
Contract(s)/Grant(s): DAAD19-03-1-0227
Report No.(s): AD-A459526; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available
Colloids; Photonics; Self Assembly; Crystals

20070005022 Williams, Morgan and Ameron, P.C., Houston, TX, USA
High Tensile Strength Carbon Nanotube Film and Process for Making the Same
Zhnag, X.; Veedu, S. T.; Liu, T.; Kumar, S.; 9 Nov 04; 13 pp.; In English
Contract(s)/Grant(s): AFOSR-F492620-03-1-0134; ONR-N00014-01-10657
Patent Info.: Filed Filed 9 Nov 04; US-Patent-Appl-SN-10-984-619
Report No.(s): PB2007-103905; No Copyright; Avail.: CASI: A03, Hardcopy

A conductive carbon nanotube film having high tensile strength and initial tensile modulus comprises primarily oxidized small-diameter carbon nanotubes wherein the diameter of the small-diameter carbon nanotubes are at most about 3 nm. A method for making the film comprises refluxing an aqueous mixture comprising carbon nanotubes and an oxidizing agent to form a refluxed nanotube dispersion; forming a carbon nanotube film from the refluxed carbon nanotube dispersion; optionally removing nitric acid or other oxidizing agent from the carbon nanotube film; drying the carbon nanotube film; and heat-treating the carbon nanotube film to form a heat-treated carbon nanotube film. The method can also comprise sonicating the nanotubes prior to or after refluxing. A heat-treated small-diameter carbon nanotube film can have a tensile strength of over 70 MPa and an initial tensile modulus of about 5 GPa.
NTIS
Carbon Nanotubes; High Strength; Strain Rate; Tensile Strength

20070005099 Los Alamos National Lab., NM USA
Enhanced Pinning in YBCO Films with Bazro3 Nanoparticles
Driscoll, J. L.; Foltyn, S. R.; 27 Jul 04; 10 pp.; In English
Contract(s)/Grant(s): DE-W-7405-ENG-36

Patent Info.: Filed Filed 27 Jul 04; US-Patent-Appl-SN-10-900-639
Report No.(s): PB2007-103841; No Copyright; Avail.: CASI: A02, Hardcopy

A process and composition of matter are provided and involve flux pinning in thin films of high temperature superconductive oxides such as YBCO by inclusion of particles including barium and a group 4 or group 5 metal, such as zirconium, in the thin film.

NTIS

Barium Oxides; Composite Materials; Copper Oxides; Nanoparticles; Nanostructures (Devices); Patent Applications; Pinning; Superconducting Films; Thin Films; Yttrium Oxides

20070005103 Istituto Nazionale di Fisica Nucleare, Frascati, Italy

Design and Testing of Gproto bunch-by-bunch Signal Processor

Teytelman, D.; Rivetta, C.; Van Winkle, D.; Akre, R.; Fox, J.; Jul. 2006; 8 pp.; In English
Report No.(s): DE2006-887071; SLAC-PUB-11943; No Copyright; Avail.: National Technical Information Service (NTIS)

A prototype programmable bunch-by-bunch signal acquisition and processing channel with multiple applications in storage rings has been developed at SLAC. The processing channel supports up to 5120 bunches with bunch spacings as close as 1.9 ns. The prototype has been tested and operated in five storage rings: SPEAR-3, DAINE, PEP-II, KEKB, and ATF damping ring. The testing included such applications as transverse and longitudinal coupled-bunch instability control, bunch-by-bunch luminosity monitoring, and injection diagnostic. In this contribution the prototype design will be described and its operation will be illustrated with the data measured at the above-mentioned accelerators.

NTIS

Linear Accelerators; Particle Accelerators; Signal Analyzers; Signal Processing

20070005105 Stanford Linear Accelerator Center, CA, USA

Amplitude Linearizers for PEP-II 1.2 MW Klystrons and LLRF Systems

Van Winkle, D.; Browne, M.; Fox, J.; Mastorides, T.; Hector Rivetta, C.; Jul. 2006; 8 pp.; In English
Report No.(s): DE2006-887070; SLAC-PUB-11945; No Copyright; Avail.: National Technical Information Service (NTIS)

The PEP-II B-factory has aggressive current increases planned for luminosity through 2008. At 2.2A (HER) on 4A (LER) currents, we estimate that longitudinal growth rates will be comparable to the damping rates currently achieved in the existing low level RF and longitudinal feedback systems. Prior to having a good non-linear time domain model it was postulated that klystron small signal gain non-linearity may be contributing to measured longitudinal growth rates being higher than linearly predicted growth rates. Five prototype klystron amplitude modulation linearizers have been developed to explore improved linearity in the LLRF system. The linearizers operate at 476 MHz with 15 dB dynamic range and 1 MHz linear control bandwidth. Results from lab measurements and high current beam tests are presented. Future development plans, conclusions from beam testing and ideas for future use of this linearization technique are presented.

NTIS

Klystrons; Luminosity; Particle Accelerators

20070005121 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA

Bunch Length Measurements at the JLab FEL Using Coherent Transition and Synchrotron Radiation

Evtushenko, P.; Coleman, J.; Jordan, K.; Klopf, J. M.; Neil, G.; May 2006; 12 pp.; In English
Report No.(s): DE2006-887107; No Copyright; Avail.: Department of Energy Information Bridge

The JLab FEL is routinely operated with sub-picosecond bunches. The short bunch length is important for high gain of the FEL. Coherent transition radiation has been used for the bunch length measurements for many years. This diagnostic can be used only in the pulsed beam mode. It is our goal to run the FEL with CW beam and a 74.85 MHz micropulse repetition rate, which, with the 135 pC nominal bunch charge corresponds to the beam average current of 10 mA. Hence it is very desirable to have the possibility of making bunch length measurements when running CW beam with any micropulse frequency. We use a Fourier transform infrared (FTIR) interferometer, which is essentially a Michelson interferometer, to measure the spectrum of the coherent synchrotron radiation generated in the last dipole of the magnetic bunch compressor upstream of the FEL wiggler. This noninvasive diagnostic provides bunch length measurements for CW beam operation at any micropulse frequency. We also compare the measurements made with the help of the FTIR interferometer with data obtained using the Martin-Puplett interferometer. Results of the two diagnostics agree within 15 %. Here we present a description of

the experimental setup, data evaluation procedure and results of the beam measurements.
NTIS
Coherent Radiation; Free Electron Lasers; Length; Particle Accelerators; Synchrotron Radiation

20070005122 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA
SNS Cryogenic Systems Commissioning
Hatfield, D.; Casagrande, F.; Campisi, I.; Gurd, P.; Howell, D.; January 2006; 12 pp.; In English
Report No.(s): DE2006-887104; No Copyright; Avail.: Department of Energy Information Bridge

The Spallation Neutron Source (SNS) is under construction at Oak Ridge National Laboratory. The cold section of the Linac consists of 81 superconducting radio frequency cavities cooled to 2.1K by a 2400 watt cryogenic refrigeration system. The major cryogenic system components include warm helium compressors with associated oil removal and gas management, 4.5K cold box, 7000L liquid helium dewar, 2.1K cold box (consisting of 4 stages of cold compressors), gaseous helium storage, helium purification and gas impurity monitoring system, liquid nitrogen storage and the cryogenic distribution transfer line system. The overall system commissioning and future plans will be presented.
NTIS
Cryogenics; Linear Accelerators; Neutron Sources; Particle Accelerators; Spallation

20070005124 Stanford Linear Accelerator Center, CA, USA, Liverpool Univ., UK
Ion Effects in the Electron Damping Ring of the International Linear Collider
Wang, L.; Raubenheimer, T.; Wolski, A.; Jun. 2006; 8 pp.; In English
Report No.(s): DE2006-887079; SLAC-PUB-11932; No Copyright; Avail.: National Technical Information Service (NTIS)

Ion-induced beam instabilities and tune shifts are critical issues for the electron damping ring of the International Linear Collider (ILC). To avoid conventional ion trapping, a long gap is introduced in the electron beam by omitting a number of successive bunches out of a long train. However, the beam can still suffer from the fast ion instability, driven by ions that last only for a single passage of the electron bunches. Our study shows that the ion effects can be significantly mitigated by using multiple gaps, so that the stored beam consists of a number of relatively short bunch trains. The ion effects in the ILC damping rings are investigated using both analytical and numerical methods.
NTIS
Damping; Particle Accelerators; Storage Rings (Particle Accelerators); Ions

20070005126 Rice Univ., Houston, TX, USA, Stanford Univ., Stanford, CA, USA
Wakefields in the LCLS Undulator Transitions
Bane, K. L. F.; Zagorodnov, I.; Jun. 2006; 8 pp.; In English
Report No.(s): DE2006-887078; SLAC-PUB-11937; No Copyright; Avail.: Department of Energy Information Bridge

For a short bunch in an elliptical collimator we demonstrate that, as in a purely round collimator, the wake can be estimated from the primary fields of the beam alone. We obtain the wakes in the LCLS rectangular-to-round, undulator transitions using a hybrid method that includes indirect numerical (field) integration and an analytical potential energy term. For the LCLS 1 nC bunch charge configuration, we find the wake-induced energy change in the transitions to be small compared to that due to the resistance of the beam pipe walls.
NTIS
Collimators; Particle Accelerators; Electron Bunching

20070005130 Rice Univ., Houston, TX, USA, Bane (K. L. F.), Stanford, CA, USA
Wakefield Calculations for 3D Collimators
Zagorodnov, I.; Bane, K. L. F.; Jun. 2006; 8 pp.; In English
Report No.(s): DE2006-887077; SLAC-PUB-11938; No Copyright; Avail.: Department of Energy Information Bridge

Using a recently developed time domain numerical approach we calculate the short-range geometric wakefields of 3D collimators and compare with analytical models. We find, in the diffractive regime, that the transverse mode kick factor can be approximated from the change in field energy between the beam pipe and the collimator if the collimator is long, or using a field clipping estimate if it is short. For collimators of past and present measurements at SLAC, numerical, analytical, and measurement results are compared.
NTIS
Collimators; Three Dimensional Models

20070005134 Stanford Linear Accelerator Center, CA, USA, Tufts Univ., Boston, MA, USA, Oregon Univ., Eugene, OR, USA

Comparison of 2 mrad and 14/20 mrad Crossing Angle Extraction Lines

Moffeit, K.; Maruyama, T.; Nosochkov, Y.; Seryi, A.; Woods, M.; Jul. 11, 2006; 26 pp.; In English

Report No.(s): DE2006-887075; SLAC-PUB-11956; No Copyright; Avail.: National Technical Information Service (NTIS)

A study of the beam distributions in the 2 mrad and 14/20 mrad extraction lines are presented. Beam losses, energy losses due to synchrotron radiation and spin diffusion are shown. Synchrotron radiation distributions generated by the beam as it traverses the extraction lines are studied.

NTIS

Crossings; Extraction; Particle Accelerators

20070005135 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA

Ion Motion in the Adiabatic Focuser

Henestroza, E.; Sessler, A. M.; Yu, S. S.; January 2006; 8 pp.; In English

Report No.(s): DE2006-887204; No Copyright; Avail.: National Technical Information Service (NTIS)

In this paper we numerically study the effect of ion motion in an adiabatic focuser, motivated by a recent suggestion that ion motion in an adiabatic focuser might be significant and even preclude operation of the focuser as previously envisioned. It is shown that despite ion motion the adiabatic focuser should work as well as originally envisioned.

NTIS

Ion Beams; Ion Motion; Particle Accelerators; Numerical Analysis

20070005158 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA

Jefferson Lab's Distributed Data Acquisition

Allison, T.; Powers, T.; January 2006; 10 pp.; In English

Report No.(s): DE2006-887125; No Copyright; Avail.: National Technical Information Service (NTIS)

Jefferson Labs Continuous Electron Beam Accelerator Facility (CEBAF) occasionally experiences fast intermittent beam instabilities that are difficult to isolate and result in downtime. The Distributed Data Acquisition (Dist DAQ) system is being developed to detect and quickly locate such instabilities. It will consist of multiple Ethernet based data acquisition chassis distributed throughout the seven-eights of a mile CEBAF site. Each chassis will monitor various control system signals that are only available locally and/or monitored by systems with small bandwidths that cannot identify fast transients. The chassis will collect data at rates up to 40 Msps in circular buffers that can be frozen and unrolled after an event trigger. These triggers will be derived from signals such as periodic timers or accelerator faults and be distributed via a custom fiber optic event trigger network. This triggering scheme will allow all the data acquisition chassis to be triggered simultaneously and provide a snapshot of relevant CEBAF control signals. The data will then be automatically analyzed for frequency content and transients to determine if and where instabilities exist.

NTIS

Data Acquisition; Electron Beams; Linear Accelerators; Particle Accelerators

20070005332 California Inst. of Tech., Pasadena, CA USA

The Effect of Temperature on the Resonant Tunneling and Electric Field Domain Formation in Multiple Quantum Well Superlattices

Xu, Yuanjian; Xhakouri, Ali; Yariv, Amnon; Feb 15, 1997; 4 pp.; In English

Report No.(s): AD-A459984; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459984; Avail.: CASI: A01, Hardcopy

Analyzing the photocurrent spectra and the I-V characteristics of weakly coupled GaAs/AlGaAs multiquantum well structures, different transport regimes are distinguished. At low temperatures (below ~50 K), due to the electron coherence over a few periods of the superlattice, electron transport is dominated by sequential resonant tunneling. At higher temperatures, evidences for the increased contribution of nonresonant transport processes, and the subsequent modification in the electric field distribution in the device, are presented.

DTIC

Electric Fields; Quantum Wells; Resonant Tunneling; Superlattices; Temperature Distribution; Temperature Effects

20070005420 Universidad Politecnica de Madrid, Madrid, Spain

Micromechanics and Microstructure Evolution: Modeling, Simulation and Experiments. Conference Held in Madrid, Spain, 12-16 Sep 2005

Oct 30, 2006; 95 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8655-05-1-5027
Report No.(s): AD-A460112; No Copyright; Avail.: CASI: A05, Hardcopy

The aim of this conference is to bring together scientists who are working on the modeling and simulation of the deformation behavior of materials and on material microstructural evolution. The focus will be on the interplay between behaviors at different length scales in particular the atomistic nano/mesoscales and continuum aspects necessary to describe the processes that lead to changes in microstructure. Of particular interest are investigations that discuss the bridging of length scales and the prediction of material properties from theory and computation. Experimental validation of the approaches is also important to differentiate between competing theories. Novel experimental techniques to guide or verify the modeling and simulation efforts also pertain to the theme of the conference. The session topics are: Atomistic Dislocation Dynamics Microstructure Evolution Continuum and Experimental.

DTIC

Conferences; Micromechanics; Microstructure; Models; Simulation; Spain

77
PHYSICS OF ELEMENTARY PARTICLES AND FIELDS

Includes quantum mechanics; theoretical physics; and statistical mechanics. For related information see also *72 Atomic and Molecular Physics, 73 Nuclear Physics*, and *25 Inorganic, Organic and Physical Chemistry*.

20070005270 Army Research Inst. of Environmental Medicine, Natick, MA USA

Use of a Spacer Vest to Increase Evaporative Cooling Under Military Body Armor

Endrusick, Thomas L; Berglund, Larry G; Gonzalez, Julio A; Gallimore, Richard; Zheng, James; Jul 2006; 6 pp.; In English
Report No.(s): AD-A459877; MISC.06-18; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459877; Avail.: CASI: A02, Hardcopy

U.S. military forces are currently using the Interceptor Body Armor (IBA) system which can increase human thermal stress when worn in arid environments. This study investigated a spacer vest (SV) designed to distance the IBA from the wearer's skin surface, increasing evaporative cooling around the torso. A series of lightweight SV designed to be worn under the IBA was tested for thermal insulation and water vapor permeability on a sweating thermal manikin (TM). The TM was dressed in 3 configurations: with the U.S. Army Temperate Battle Dress Uniform (TBDU); with the IBA over the TBDU; and with the IBA over the various SV and the TBDU. TM results were used as input to a computer model predicting core temperature, skin temperature, heart rate, sweat rate, skin wettedness, and total body water loss. Output described responses when exposed to desert environments with air temperatures of 30, 40 and 50 degrees C during repeated, intermittent exercise (10 min rest/ 30 min walk). TM results showed thermal insulation increased and water vapor permeability decreased when IBA was worn over the TBDU. Use of a SV between the IBA and TBDU reduced thermal insulation and increased water vapor permeability. This translated into a theoretical increase in whole body evaporative cooling potential of approximately 20% when wearing a SV compared to wearing the IBA without a SV.

DTIC

Armor; Cooling; Evaporation; Evaporative Cooling; Spacers; Vests

20070005271 Army Research Inst. of Environmental Medicine, Natick, MA USA

Transient Sweat Rate Calculation from Humidity Measurements Under Clothing

Yokota, Miyo; Berglund, Larry G; Gonzalez, Julio A; Blanchard, Laurie A; Jul 2006; 10 pp.; In English
Report No.(s): AD-A459878; MISC.06-20; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459878; Avail.: CASI: A02, Hardcopy

This study demonstrates a method for monitoring evaporative sweat rates (EvapSR) during steady and intermittent activities. The method was validated on a sweating thermal manikin wearing a long sleeved shirt and trousers (standard military battle dress uniform) instrumented with temperature-humidity sensors under the clothing. The manikin tests were at steady state conditions in an environmental chamber at 35 degrees C/50%RH and wind speed ranging between 0.36 and 1.94 m.s-1. The manikin was adjusted to produce sweat rates between 0 and 150 g.m-2. h-1. EvapSR was estimated from weighted measured skin wettedness and the maximum evaporative rate, and compared to the manikin's sweat rate. This technique was

further validated with humans engaged in intermittent work. Overall, this is a simple promising approach for estimating EvapSR. The method is non-invasive and enables monitoring and assessment for safety, health and hydration status of industrial and military personnel engaged in a wide range of situations.
DTIC
Clothing; Humidity; Humidity Measurement; Measurement; Perspiration; Sweat

20070005300 California Univ., Santa Cruz, CA USA
Cooling Enhancement Using Inhomogeneous Thermoelectric Materials
Bian, Zhixi; Shakouri, Ali; Jan 2006; 5 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459926; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459926; Avail.: CASI: A01, Hardcopy

The maximum cooling temperature of a thermoelectric refrigerator made of uniform bulk material is limited by its dimensionless figure-of-merit ZT. Cascaded stages are typically needed in order to obtain a higher cooling temperature. Multiple stage configurations have disadvantages of device complexity, and reduced efficiency due to the non-ideal heat spreading between different stages. In this paper, we prove that the maximum cooling temperature can be increased by using a single stage made of inhomogeneous material. This optimization is different from conventional graded materials where there is a large temperature gradient and local material properties are optimized in order to achieve the highest ZT at the local temperature under operation. The new optimization is attributed to the redistribution of the Joule heating and Peltier cooling profiles along the current and heat flow directions. The cooling efficiency can also be increased by a moderate amount. Numerical simulations are used to optimize the doping profile for a thermoelectric cooler based on single crystal silicon.
DTIC
Augmentation; Cooling; Thermoelectric Cooling; Thermoelectric Materials

20070005302 Air Force Research Lab., Hanscom AFB, MA USA
A Multi-Josephson Junction Qubit
Yukon, Stanford P; Jun 25, 2002; 5 pp.; In English
Contract(s)/Grant(s): Proj-2304
Report No.(s): AD-A459930; AFRL-SN-HS-JA-2001-0234; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459930; Avail.: CASI: A01, Hardcopy

We have designed a persistent supercurrent multi-Josephson junction (JJ) qubit whose circuit is based on a flattened JJ triangular prism. The Schroedinger equation for the 1D constrained system is equivalent to the Whittaker Hill equation, for which exact solutions have been found [1]. Symmetric or antisymmetric coupling of the qubit to an external magnetic field, will excite only the corresponding symmetric or antisymmetric terms in the Hamiltonian. This specificity allows coupling to a system bus comprised of an LC resonant loop. We indicate how separate buses might be coupled into a larger branching network.
DTIC
Josephson Junctions; Quantum Dots

20070005400 California Univ., Santa Cruz, CA USA
Material Optimization for Heterostructure Integrated Thermionic Coolers
Shakouri, Ali; LaBounty, Chris; Sep 1999; 6 pp.; In English
Report No.(s): AD-A460087; No Copyright; Avail.: CASI: A02, Hardcopy

The material figure-of-merit for conventional thermoelectrics is micro meff 1.5/beta where micro is the electron or hole mobility, meff its effective mass, and beta the material thermal conductivity. From the electronic point of view, in order to optimize the cooler performance, there is a trade off between electron effective mass and its mobility. While high mobility is inherently important to facilitate electron transport in the material and reduce the Joule heating, a large effective mass is only required due to the symmetry of electronic density-of-states with respect to the Fermi energy in an energy range on the order of thermal energy (k sub b*T) near the Fermi level. It is possible to increase this asymmetry by using doping densities so that the Fermi level is close to the bandedge. In this case there is a small number of electrons participating in the conduction and the net transport of heat is small. We clarify how this trade off is alleviated in high barrier thermionic coolers. Prospects for different material systems to realize bulk and superlattice thermionic coolers are also discussed.
DTIC
Coolers; Electrical Resistivity; Thermoelectricity

20070005451 Naval Medical Research Inst., Bethesda, MD USA

A Review of Manned Thermal Garment Diving Studies With Lessons Learned for the SDV Operator and Combat Swimmer

Valaik, Daniel J; Jul 1996; 68 pp.; In English

Contract(s)/Grant(s): Proj-407BB

Report No.(s): AD-A460166; NMRI-96-47; No Copyright; Avail.: CASI: A04, Hardcopy

This report reviews 11 of the most relevant manned thermal studies applicable to SDV and combat-swimmer diving. It comments upon them in three broad categories, as follows: 1. Wet-Suit Studies 2. Dry-Suit Studies 3. Other Special Operations Cold-Water Diving-Related Studies Lessons learned from the studies are translated into practical recommendations for the SDV operator andlor combat swimmer.

DTIC

Combat; Diving (Underwater); Garments; Shuttle Derived Vehicles; Thermodynamic Properties

80
SOCIAL AND INFORMATION SCIENCES (GENERAL)

Includes general research topics related to sociology; educational programs and curricula. For specific topics in these areas see *categories 81 through 85*.

20070004626 Army War Coll., Carlisle Barracks, PA USA

Human Dimensions of Strategic Leadership: A Selected Bibliography

Dec 2006; 29 pp.; In English

Report No.(s): AD-A459809; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Bibliographies; Leadership; Human Performance

81
ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

20070003721 NASA Johnson Space Center, Houston, TX, USA

Effective Teamwork: The EVA NBL Experience

Crocker, Lori; Feb. 7, 2007; 14 pp.; In English; PM Challenge, 6-7 Feb. 2007, Galveston, TX, USA; Original contains color illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003721; Avail.: CASI: A03, Hardcopy

This viewgraph presentation reviews the experience of improving the operation of the ExtraVehiclar Activity (EVA) Neutral Buoyancy Laboratory as a team of NASA employees and contractors. It reviews specific recommendations to use in turning a struggling organization around as a NASA/contractor team

CASI

Contractors; Employee Relations; Human Resources; Personnel Management; Government/Industry Relations; Morale; Leadership; Personnel

20070004801 National Inst. of Standards and Technology, Gaithersburg, MD USA

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design, Construction, and Maintenance of Structural and Life Safety Systems. NIST NCSTAR 1-1

Lew, H. S.; Bukowski, R. W.; Carino, N. J.; Sep. 2005; 280 pp.; In English

Report No.(s): PB2007-104565; No Copyright; Avail.: CASI: A13, Hardcopy

The collapse of World Trade Center (WTC) 1, 2, and 7 resulted from structural damage from direct and indirect effects of aircraft impact and the ensuing fires. Thus, for collapse analyses of these buildings, knowledge of the physical state of the structural and fire safety systems prior to the aircraft impact is essential. To obtain information for the collapse analysis of the buildings, National Institute of Standards and Technology reviewed design and construction documents, correspondence, and memoranda related to the building projects; interviewed individuals involved in the design, construction, and maintenance of the buildings; obtained information from regulatory and emergency services agencies of New York City; and reviewed books and published journal and magazine articles related to the WTC building projects. Information obtained from various sources

are synthesized and summarized in this report. Specifically, this report presents (1) provisions used to design and construct the structural, fire protection and egress systems of the buildings; (2) tests performed to support the design of these systems; (3) criteria that governed the design of the structural and fire protection systems; (4) methods used to proportion structural members and other components of the buildings; (5) innovative features, technologies and materials that are incorporated in design and construction of the structural and fire protection systems; (6) details of deviations to the contract documents granted by Port Authority of New York and New Jersey; (7) fabrication and inspection requirements at the fabrication yard; and (8) inspection protocols during construction.
NTIS
Buildings; Construction; Damage; Fire Prevention; Maintenance; Safety

20070004804 Ghosh (S. K.) Associates, Inc., Northbrook, IL, USA
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. NIST NCSTAR 1-1A. (Appendices not included)
Fanella, D. A.; Derecho, A. T.; Ghosh, S. K.; Sep. 2005; 166 pp.; In English
Report No.(s): PB2007-104566; No Copyright; Avail.: CASI: A08, Hardcopy

This report describes the provisions that were used to design and construct World Trade Center 1, 2, and 7. Included is a summary of the major provisions in the codes and standards together with the loads and load combinations that were used to design the buildings. Methods used to proportion the structural members and other components of the buildings are also discussed, as well as tests that were performed to support the design. It is shown that the loads that were used to design the members were at equal to those prescribed in the applicable codes and standards, and that the methods used to proportion the structural members followed the requirements in the applicable material design standards available at that time. Also included in this report are the innovative systems, technologies, and materials that were used in the buildings, and the Port Authority's acceptance procedures for such items. Fabrication and inspection requirements at the fabrication yard and inspection protocol during construction are discussed. Also covered are the details of the deviations to contract documents that were granted by the Port Authority, including the justifications for those deviations.
NTIS
Buildings; Damage; Fire Prevention

20070004805 Port Authority of New York and New Jersey, Jersey City, NJ, USA
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. Appendices A-B
Sep. 2005; 84 pp.; In English
Report No.(s): PB2007-104567; No Copyright; Avail.: CASI: A05, Hardcopy

Appendix A contains the supporting documents that are referenced in Chapter 2 of this report. All of the documents contained in this appendix are reproduced with permission of The Port Authority of New York and New Jersey. Table A-1 contains a summary of supporting documents and their location within this appendix. The footnote numbers given in the table correspond to those in Chapter 2. Appendix B contains the supporting documents that are referenced in Chapter 3 of this report. All of the documents (with the exception of the Laclede Steel Company correspondence) contained in this appendix are reproduced with permission of The Port Authority of New York and New Jersey. Table B-1 contains a summary of supporting documents and their location within this appendix. The footnote numbers given in the table correspond to those in Chapter 3.
NTIS
Buildings; Damage; Fire Prevention; Construction

20070004807 Port Authority of New York and New Jersey, Jersey City, NJ, USA
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. Appendices C-G
Sep. 2005; 304 pp.; In English
Report No.(s): PB2007-104568; No Copyright; Avail.: CASI: A14, Hardcopy

The collapse of World Trade Center (WTC) 1, 2, and 7 resulted from structural damage from direct and indirect effects of aircraft impact and the ensuing fires. Thus, for collapse analyses of these buildings, knowledge of the physical state of the structural and fire safety systems prior to the aircraft impact is essential. To obtain information for the collapse analysis of the buildings, National Institute of Standards and Technology reviewed design and construction documents, correspondence, and

memoranda related to the building projects; interviewed individuals involved in the design, construction, and maintenance of the buildings; obtained information from regulatory and emergency services agencies of New York City; and reviewed books and published journal and magazine articles related to the WTC building projects. Information obtained from various sources are synthesized and summarized in this report. Specifically, this report presents (1) provisions used to design and construct the structural, fire protection and egress systems of the buildings; (2) tests performed to support the design of these systems; (3) criteria that governed the design of the structural and fire protection systems; (4) methods used to proportion structural members and other components of the buildings; (5) innovative features, technologies and materials that are incorporated in design and construction of the structural and fire protection systems; (6) details of deviations to the contract documents granted by Port Authority of New York and New Jersey; (7) fabrication and inspection requirements at the fabrication yard; and (8) inspection protocols during construction.
NTIS
Buildings; Damage; Fire Prevention; Construction

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*.

20070003498 International Computer Science Inst., Berkeley, CA USA
Question Answering Based on Semantic Structures
Narayanan, Srini; Harabagiu, Sanda; Jan 2004; 10 pp.; In English
Report No.(s): AD-A458871; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA458871; Avail.: CASI: A02, Hardcopy

The ability to answer complex questions posed in Natural Language depends on (1) the depth of the available semantic representations and (2) the inferential mechanisms they Support. In this paper we describe a QA architecture where questions are analyzed and candidate answers generated by 1) identifying predicate argument structures and semantic frames from the input and 2) performing structured probabilistic inference using the extracted relations in the context of a domain and scenario model. A novel aspect of our system is a scalable and expressive representation of actions and events based on Coordinated Probabilistic Relational Models (CPRM). In this paper we report on the ability of the implemented system to perform several forms of probabilistic and temporal inferences to extract answers to complex questions. The results indicate enhanced accuracy over current state-of-the-art Q/A systems.
DTIC
Natural Language (Computers); Semantics

20070003511 University of Southern California, Marina del Rey, CA USA
Automated Story Capture From Conversational Speech
Gordon, Andrew S; Ganesan, Kavita; Oct 5, 2005; 9 pp.; In English
Report No.(s): AD-A459167; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459167; Avail.: CASI: A02, Hardcopy

While storytelling has long been recognized as an important part of effective knowledge management in organizations, knowledge management technologies have generally not distinguished between stories and other types of discourse. In this paper we describe a new type of technological support for storytelling that involves automatically capturing the stories that people tell to each other in conversations. We describe our first attempt at constructing an automated story extraction system using statistical text classification and a simple voting scheme. We evaluate the performance of this system and demonstrate that useful levels of precision and recall can be obtained when analyzing transcripts of interviews, but that performance on speech recognition data is not above what can be expected by chance. This paper establishes the level of performance that can be obtained using a straightforward approach to story extraction, and outlines ways in which future systems can improve on these results and enable a wide range of knowledge socialization applications.
DTIC
Extraction; Information Management; Speech Recognition

20070003562 Maryland Univ., College Park, MD USA

Feature Normalization for Video Indexing and Retrieval

Nov 1996; 40 pp.; In English

Report No.(s): AD-A459805; LAMP-TR-003; CFAR-TR-847; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Video Communication; Indexing (Information Science)

20070003753 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA

HDF5-Fast Query: An API for Simplifying Access to Data Storage, Retrieval, Indexing and Querying

Bethel, E. W.; Gosink, L.; Shalf, J.; Stockinger, K.; Wu, K.; January 2006; 2 pp.; In English

Report No.(s): DE2006-888964; No Copyright; Avail.: Department of Energy Information Bridge

This work focuses on research and development activities that bridge a gap between fundamental data management technology--index, query, storage and retrieval--and use of such technology in computational and computer science algorithms and applications. The work has resulted in a streamlined applications programming interface (API) that simplifies data storage and retrieval using the HDF5 data I/O library, and eases use of the FastBit compressed bitmap indexing software for data indexing/querying. The API, which we call HDF5-FastQuery, will have broad applications in domain sciences as well as associated data analysis and visualization applications.

NTIS

Data Base Management Systems; Data Storage; Simplification

20070003832 Texas Univ., Arlington, TX USA

Subdue: Compression-Based Frequent Pattern Discovery in Graph Data

Ketkar, Nikhil S; Holder, Lawrence B; Cook, Diane J; Jan 2005; 7 pp.; In English

Contract(s)/Grant(s): F30602-01-2-0570

Report No.(s): AD-A459053; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459053; Avail.: CASI: A02, Hardcopy

A majority of the existing algorithms which mine graph datasets target complete, frequent sub-graph discovery. We describe the graph-based data mining system Subdue which focuses on the discovery of sub-graphs which are not only frequent but also compress the graph dataset, using a heuristic algorithm. The rationale behind the use of a compression-based methodology for frequent pattern discovery is to produce a fewer number of highly interesting patterns than to generate a large number of patterns from which interesting patterns need to be identified. We perform an experimental comparison of Subdue with the graph mining systems gSpan and FSG on the Chemical Toxicity and the Chemical Compounds datasets that are provided with gSpan. We present results on the performance on the Subdue system on the Mutagenesis and the KDD 2003 Citation Graph dataset. An analysis of the results indicates that Subdue can efficiently discover best-compressing frequent patterns which are fewer in number but can be of higher interest.

DTIC

Information Retrieval; Data Compression; Graphs (Charts)

20070003838 Carnegie-Mellon Univ., Pittsburgh, PA USA

Fully Automatic Cross-Associations

Chakrabarti, Deepayan; Modha, Dharmendra S; Papadimitriou, Spiros; Fabloutsos, Christos; Aug 2004; 24 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N66001-00-1-8936; NSF-IIS-9817496

Report No.(s): AD-A459025; CMU-CALD-04-107; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459025; Avail.: CASI: A03, Hardcopy

Large, sparse binary matrices arise in numerous data mining applications, such as the analysis of market baskets, web graphs, social networks, co-citations, as well as information retrieval, collaborative filtering, sparse matrix reordering, etc. Virtually all popular methods for the analysis of such matrices e.g., k-means clustering, METIS graph partitioning, SVD/PCA and frequent itemset mining require the user to specify various parameters, such as the number of clusters, number of principal components, number of partitions, and support. Choosing suitable values for such parameters is a challenging problem. Cross-association is a joint decomposition of a binary matrix into disjoint row and column groups such that the rectangular intersections of groups are homogeneous. Starting from first principles, we furnish a clear, information theoretic criterion to choose a good cross-association as well as its parameters, namely, the number of row and column groups. We provide scalable

algorithms to approach the optimal. Our algorithm is parameter-free, and requires no user intervention. In practice it scales linearly with the problem size, and is thus applicable to very large matrices. Finally, we present experiments on multiple synthetic and real-life datasets, where our method gives high-quality, intuitive results.
DTIC
Information Retrieval; Automatic Control; Algorithms

20070003846 Mitre Corp., Bedford, MA USA
Global Grid Architecture Concept
Schiavone, Leonard J; Oct 1999; 4 pp.; In English
Contract(s)/Grant(s): F19628-94-C-0001
Report No.(s): AD-A458854; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA458854; Avail.: CASI: A01, Hardcopy

Military operations are becoming increasingly reliant on a communications and information infrastructure that provides seamless, interoperable connectivity between all forces, anytime and everywhere. This operational emphasis is changing the manner in which command and control (C2) systems are defined, developed and fielded. Communication systems can no longer be ‚application-centric'. Instead, we must define a communications infrastructure to support a variety of applications and missions. In particular, communications systems must be interconnected to create a network accessible by all applications and users. This network-centric communications infrastructure has been coined the Global Grid. In many ways, the tremendous technology advances over the past ten years in the commercial world are making the Global Grid realizable.
DTIC
Command and Control; Architecture (Computers)

20070004711 Applied Research Associates, Inc., Champaign, IL, USA
Advanced Quality Systems: Guidelines for Establishing and Maintaining Construction Quality Databases
Rao, C.; Darter, M. I.; Smit, A. F.; Mallela, J.; Smith, K. L.; Nov. 2006; 110 pp.; In English
Contract(s)/Grant(s): DTFH61-05-D-00027
Report No.(s): PB2007-103341; No Copyright; Avail.: CASI: A06, Hardcopy

The main objective of this study was to develop and present guidelines for State highway agencies (SHAs) in establishing and maintaining database systems geared towards construction quality issues for asphalt and concrete paying projects. To accomplish this, a literature search and review was performed on the subject matter, followed by a survey of construction quality practices at nine States and a more detailed review of practices at four of those nine States. Information collected from the survey responses and the in-depth interviews provided insight into the multiple databases maintained by the agencies, the data categories stored, the analyses performed, links to other State databases, and the reports generated. Results indicated that the nature of information collected, the level of detail in the process, and the length over which this information is retained, differ significantly from agency to agency. In addition, the current systems differ considerably in their architecture, purpose, data collection and access procedures.
NTIS
Construction; Data Bases; Highways

20070004735 Argonne National Lab., IL, USA, Sarah Lawrence Coll., Bronxville, NY, USA
Ecology, Environmental Research at Argonne National Laboratory, 1955-1985
Schloegel, J. J.; Sep. 2005; 68 pp.; In English
Report No.(s): DE2006-885500; ANL/HIST-4; No Copyright; Avail.: National Technical Information Service (NTIS)

No abstract available
Bibliographies; Ecology; Environmental Laboratories

20070004744 Department of Justice, Washington, DC, USA
Fusion Center Guidelines: Developing and Sharing Information and Intelligence in a New Era
Aug. 2006; 104 pp.; In English
Report No.(s): PB2007-103615; No Copyright; Avail.: CASI: A06, Hardcopy

The need to develop and share information and intelligence across all levels of government has significantly changed over the last few years. The long-standing information sharing challenges among law enforcement agencies, public safety agencies, and the private sector are slowly disappearing. Yet, the need to identify, prevent, monitor, and respond to terrorist and criminal

activities remains a significant need for the law enforcement, intelligence, public safety, and private sector communities.
NTIS
Intelligence; Information Dissemination; Computer Information Security

20070004747 Indian Health Service, Rockville, MD, USA
Risk Management and Medical Liability: A Manual for Indian Health Service and Tribal Health Care Professionals. Second Edition
Heath, S. W.; Apr. 2006; 59 pp.; In English
Report No.(s): PB2007-103602; No Copyright; Avail.: CASI: A04, Hardcopy

An initiative began in 1986 at the Indian Health Service (IHS) Headquarters level to more thoroughly review and assess each medical malpractice tort claim that involved care within the IHS or Tribal network of hospitals and clinics. A database was developed to track these claims through the system and provide summary reports and feedback to the service units. The first edition of this Manual in 1996 reported the IHS experience with medical malpractice tort claims over a ten year period, and gave recommendations on risk management practices. Now, ten years later, many things have changed. The number of claims filed against IHS and Tribal facilities has increased and the processes by which claims are reviewed have also evolved. More recently, the IHS has become a reporting entity to the National Practitioner Data Bank (NPDB), which has brought a whole new dimension to the Agency's Risk Management Program. This revision of the Manual delineates the process changes that have taken place, updates data on tort claims, describes the IHS role in NPDB reporting, and provides additional risk management guidance for local programs and health care professionals.
NTIS
Data Bases; Health; Liabilities; Manuals; Risk

20070004748 Federal Bureau of Investigation, Washington, DC, USA
Developments in the National Incident-Based Reporting System (NIBRS) (Updated July 2006)
January 2006; 61 pp.; In English
Report No.(s): PB2007-103600; No Copyright; Avail.: CASI: A04, Hardcopy

As law enforcement agencies change from the Summary reporting system to NIBRS, they have called upon many vendors to develop incident-based systems that comply with the Uniform Crime Reporting (UCR) Program standards yet accommodate their agency's unique requirements. In laying the foundation for NIBRS, the FBI published a series of documents to assist agencies and vendors in building successful records management systems. To help all vendors and other interested parties keep abreast of the most current information concerning NIBRS, the FBI has extracted pertinent information from UCR State Program Bulletins and is providing it in this document, which will be updated as needed. This document contains a synopsis of each of the NIBRS publications, all of which are maintained in their entirety on the FBI's UCR Web page, which now includes Portable Document Format (PDF) files of the Uniform Crime Reporting Handbook, NIBRS Edition (1992) and Volume 3: Approaches to Implementing an Incident-Based Reporting (IBR) System. This document also contains excerpts from UCR State Program Bulletins that provide a historical perspective of the evolution of NIBRS including procedural changes, reporting clarifications, and policy additions that have occurred from 1999 to July 2006.
NTIS
Crime; Law (Jurisprudence)

20070004848 National Center for Education Statistics, Washington, DC, USA, RTI International, Research Triangle Park, NC, USA
Postsecondary Institutions in the USA: Fall 2005 and Degrees and Other Awards Conferred: 2004-05. First Look
Knapp, L. G.; Kelly-Reid, J. E.; Whitmore, R. W.; Miller, E.; Dec. 2006; 34 pp.; In English
Report No.(s): PB2007-105123; NCES-2007-167; No Copyright; Avail.: CASI: A03, Hardcopy

This First Look presents findings from the Integrated Postsecondary Education Data System (IPEDS) fall 2005 data collection, which included two survey components: Institutional Characteristics for the 2005-06 academic year, and Completions covering the period July 1, 2004, through June 30, 2005. These data were collected through the IPEDS web-based data collection system. The data on which this report is based are available to researchers and the public through the IPEDS Peer Analysis System and College Opportunities Online Locator. Both of these sources can be found at http://nces.ed.gov/ipeds. This First Look report continues the series previously named E.D. TABs based on the collection of

data from over 6,500 postsecondary education institutions that participate in Title IV federal student financial aid programs.
NTIS
Data Systems; Education; Systems Integration

20070004922 Baker (Wilfred) Engineering, Inc., San Antonio, TX USA
Model Selection in Summary Evaluation
Dec 2002; 14 pp.; In English
Contract(s)/Grant(s): N00014-00-1-0907; N00014-02-1-0916
Report No.(s): AD-A459486; AL MEMO 2002-023; CBCL MEMO 222; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available
Evaluation; Models; Summaries

20070004946 Department of Housing and Urban Development, Washington, DC, USA
Evolution of the U.S. Housing Finance System: A Historical Survey and Lessons for Emerging Mortgage Markets
Oct. 22, 2004; 44 pp.; In Spanish
Report No.(s): PB2007-103645; No Copyright; Avail.: CASI: A03, Hardcopy

In the past 180 years, the U.S. housing finance system (HFS) has evolved from an informal/communal institutional arrangement to one of the most well-functioning and extensive financial intermediation systems in the world. This evolution did not develop in a linear fashion in that policy changes were made in response to economic shocks and that innovations such as mortgage products, mortgage-related securities, specialized institutions, and risk management tools appeared discretely over time in government policies. This study seeks to provide a critical survey of this evolutionary process focusing on milestone events and the shaping of key functions of the U.S. HFS over time. It also aims to infer lessons from the U.S. experience for assisting emerging mortgage market systems. Four particular countries representing diverse market and institutional conditions are selected for contrast with the U.S. HFS: Mexico, Korea, South Africa, and Poland.
NTIS
Finance; Histories; Industries; Market Research; Surveys

20070004948 Department of Housing and Urban Development, Washington, DC, USA
Evolution of the U.S. Housing Finance System: A Historical Survey and Lessons for Emerging Mortgage Markets
Oct. 22, 2004; 43 pp.; In French
Report No.(s): PB2007-103644; No Copyright; Avail.: CASI: A03, Hardcopy

In the past 180 years, the U.S. housing finance system (HFS) has evolved from an informal/communal institutional arrangement to one of the most well-functioning and extensive financial intermediation systems in the world. This evolution did not develop in a linear fashion in that policy changes were made in response to economic shocks and that innovations such as mortgage products, mortgage-related securities, specialized institutions, and risk management tools appeared discretely over time in government policies. This study seeks to provide a critical survey of this evolutionary process focusing on milestone events and the shaping of key functions of the U.S. HFS over time. It also aims to infer lessons from the U.S. experience for assisting emerging mortgage market systems. Four particular countries representing diverse market and institutional conditions are selected for contrast with the U.S. HFS: Mexico, Korea, South Africa, and Poland.
NTIS
Finance; Histories; Industries; Market Research; Surveys

20070005012 Colburn (Cantor), LLP, Bloomfield, CT, USA
Architecture for Rendering Graphics on Output Devices Over Diverse Connections
Chun, W. S.; Napoli, J.; Purtell, T. J.; 7 Jul 05; 20 pp.; In English
Contract(s)/Grant(s): NIST-70NANB3H3028
Patent Info.: Filed Filed 7 Jul 05; US-Patent-Appl-SN-11-176-482
Report No.(s): PB2007-103894; No Copyright; Avail.: CASI: A03, Hardcopy

A system for displaying graphical information. The system includes an asset server for storing information and a rendering server in communication with the asset server. The rendering server receives a graphics command and renders graphic display data in response to the graphics command and to the information. The rendering server is independently addressable from the asset server.

NTIS

Display Devices; Graphs (Charts); Patent Applications

20070005020 Computer Sciences Corp., Falls Church, VA, USA, Montana State Coll., Bozeman, MT, USA

CETIS: Complex Effluents Toxicity Information System. CETIS Retrieval System User's Manual

Gueldner, D. R.; Pilli, A.; Crane, J. L.; Sivertson, D. J.; Nov. 1984; 70 pp.; In English

Report No.(s): PB2007-106164; EPA 600/8-84-030; No Copyright; Avail.: CASI: A04, Hardcopy

A computerized Complex Effluent Toxicity Information System (CETIS) data base has been developed to assemble the results of effluent toxicity tests so toxicity characteristics of complex effluents can be determined on an industry-by-industry basis. The information is available through the National Computer Center (NCC) to state or regional environmental offices to assist them in determining where to use toxicity testing, in interpreting the results, and in setting discharge limits. This data base was designed collaboratively by the Environmental Research Laboratory-Duluth (ERL-D) of the Office of Research and Development and the Permits Division of the Office of Water.

NTIS

Complex Systems; Effluents; Information Systems; Toxicity; User Manuals (Computer Programs); Water Pollution

20070005031 National Cancer Inst., Bethesda, MD, USA

Report Back from the NCI-Wide Workshop: Enhancing Interactions to Reduce Cancer Health Disparities. Held on July 17th, 2006

Johnson, L.; Bennett, L. M.; Jul. 2006; 23 pp.; In English

Report No.(s): PB2007-104335; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Audio Equipment; Cancer; Health

20070005141 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA

Tariff Analysis Project: A Database and Analysis Platform for Electrictiy Tariffs

Coughlin, K.; White, R.; Boulduc, C.; Fisher, D.; Rosenquist, G.; May 2006; 56 pp.; In English

Report No.(s): DE2006-887433; No Copyright; Avail.: National Technical Information Service (NTIS)

Much of the work done in energy research involves an analysis of the costs and benefits of energy-saving technologies and other measures from the perspective of the consumer. The economic value in particular depends on the price of energy (electricity, gas or other fuel), which varies significantly both for different types of consumers, and for different regions of the country. Ideally, to provide accurate information about the economic value of energy savings, prices should be computed directly from real tariffs as defined by utility companies. A large number of utility tariffs are now available freely over the web, but the complexity and diversity of tariff structures presents a considerable barrier to using them in practice. The goal of the Tariff Analysis Project (TAP) is to collect and archive a statistically complete sample of real utility tariffs, and build a set of database and web tools that make this information relatively easy to use in cost-benefit analysis. This report presents a detailed picture of the current TAP database structure and web interface. While TAP has been designed to handle tariffs for any kind of utility service, the focus here is on electric utilities within the USA. Electricity tariffs can be very complicated, so the database structures that have been built to accommodate them are quite flexible and can be easily generalized to other commodities. This report is organized as follows: In the rest of this section we discuss the project background, and provide an overview of how electricity tariffs function and what kinds of prices they define. In Section 2 we describe the TAP database in detail, including definitions of all the TAP tables and the fields they contain. Section 3 discusses how to input data to TAP, and presents a set of Perl scripts that can be used to do bill calculations from TAP data. In Section 4 we describe the web interface that has been built to view, enter and edit TAP data, and the OnTAP SOAP server. These applications are written in PHP (3). In the Appendix we provide a set of tables detailing the database structure and summarizing the functionality and dependencies of the web scripts.

NTIS

Data Bases; Utilities; Electricity

20070005193 University of Southern California, Los Angeles, CA USA

Exploiting Secondary Sources for Unsupervised Record Linkage

Michalowski, Martin; Thakkar, Snehal; Knoblock, Craig A; Jan 2004; 7 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F49620-01-1-0053; FA9550-04-1-0105
Report No.(s): AD-A459586; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459586; Avail.: Defense Technical Information Center (DTIC)

XML, Web services, and the Semantic Web have opened the door for new and exciting information integration applications. Information sources on the web are controlled by different organizations or people, utilize different text formats, and have varying inconsistencies. Therefore, any system that integrates information from different data sources must identify common entities from these sources. Data from many online sources does not contain enough information to accurately link the records using state of the art record linkage systems. There is an inherent need for learning in these systems, most of the time requiring a user in the loop, to accurately link records across datasets. In this paper we describe a novel approach to exploiting additional data sources to design an unsupervised record linkage method. Our evaluation using real world data sets shows that the performance of unsupervised learning in a record linkage system is on par with traditional supervised learning methods.

DTIC

Data Processing; Internets; Linkages; Machine Learning

20070005213 Drexel Univ., Philadelphia, PA USA

Hierarchical Role-based Viewing for Multi-level Information Security in Collaborative CAD

Cera, Christopher D; Kim, Taeseong; Braude, Ilya; Han, JungHyun; Regli, William C; Jan 2004; 21 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-01-1-0618
Report No.(s): AD-A459679; DU-CS-04-01; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459679; Avail.: CASI: A03, Hardcopy

Information security and assurance are new frontiers for collaborative design. In this context, information assurance (IA) refers to methodologies to protect engineering information by ensuring its availability, confidentiality, integrity, non-repudiation, authentication, and access control. In collaborative design, IA techniques are needed to protect intellectual property, establish security privileges, and create ‘need to know’ protections on critical features. This paper provides a framework for information assurance within collaborative design based on a technique the authors call ‘Role-based Viewing.’ They extend upon prior work to present ‘Hierarchical Role-based Viewing’ as a more flexible and practical approach since role hierarchies naturally reflect an organization’s line of authority and responsibility. They establish a direct correspondence between multi-level security and multiresolution surfaces where a hierarchy is represented as a weighted directed acyclic graph. The permission discovery process is formalized as a graph reachability problem and the path cost is used as input to a multiresolution function. By incorporating security with collaborative design, the costs and risks incurred by multi-organizational collaboration can be reduced. The authors believe that this work is the first of its kind to unite multi-level security and information clouding with geometric data, including multiresolution surfaces, in the fields of computer-aided design and collaborative engineering.

DTIC

Access Control; Computer Aided Design; Computer Graphics; Internets; Numerical Control; Security; Viewing

20070005225 Mitre Corp., Bedford, MA USA

MiTPA for Real Users, Real Data, Real Problems

Damianos, Laurie; Wohlever, Steve; Kozeriok, Robyn; Ponte, Jay; Apr 2003; 3 pp.; In English
Contract(s)/Grant(s): DAAB07-01-C-C201
Report No.(s): AD-A459750; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459750; Avail.: CASI: A01, Hardcopy

The MiTAP system was developed as an experimental prototype using human language technologies for monitoring disease outbreaks. The system provides timely, multi-lingual, global information access to analysts, medical experts and individuals involved in humanitarian assistance. Thousands of articles from electronic information sources spanning multiple languages are automatically captured, translated, tagged, summarized, and presented to users in a variety of ways. Real users access MiTAP daily to solve real problems. The successful adoption of MiTAP is attributed to its user-focused design that accommodates the imperfect component technologies and allows users to interact with the system in familiar ways. We will

discuss the problem, design process, and implementation from the perspective of services provided and how these services support system capabilities that satisfy user requirements.
DTIC
Diseases; Information Systems

20070005252 Department of Defense, Washington, DC USA
Tasks, Domains, and Languages
Onyshkevych, Boyan; Okurowski, Mary E; Carlson, Lynn; Jan 1993; 12 pp.; In English
Report No.(s): AD-A459848; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459848; Avail.: CASI: A03, Hardcopy

The Fifth Message Understanding Conference (MUC-5) involved the same tasks, domains and languages as the information extraction portion of the ARPA TIPSTER program. These tasks center on automatically filling object-oriented data structures, called templates, with information extracted from free text in news stories (for discussion of templates and objects, see 'Template Design for Information Extraction' in this volume). For each task, a generic type of information that is specified for extraction corresponds to each of the slots in the templates. With text as input, the MUC-5 systems first detect whether the text contains relevant information. If available, the systems extract specific instances of The generic types from the text and output that information by filling the template slots with the appropriately formatted data representations. These slots are then scored by using an automatic scoring program with analyst-produced templates as the keys. Human analysts also prepared development set templates for each domain, which served as training models for system developers (for discussion of the data preparation effort, see 'Corpora and Data Preparation' in this volume).
DTIC
Data Processing; Domains; Information Retrieval; Languages; Templates; Texts

20070005254 Army Research Lab., Adelphi, MD USA
When is an Embedded MT System 'Good Enough' for Filtering?
Voss, Clare R; Van Ess-Dykema, Carol; Jan 2000; 9 pp.; In English
Report No.(s): AD-A459850; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459850; Avail.: CASI: A02, Hardcopy

This paper proposes an end-to-end process analysis template with replicable measures to evaluate the filtering performance of a Scan-OCR-MT system. Preliminary results across three language-specific FALCon2 systems show that, with one exception, the derived measures consistently yield the same performance ranking: Haitian Creole at the low end, Arabic in the middle, and Spanish at the high end.
DTIC
Data Processing; Information Retrieval; Texts

20070005267 Carnegie-Mellon Univ., Pittsburgh, PA USA
Tri-Plots: Scalable Tools for Multidimensional Data Mining
Traina, Agma; Traina, Caetano; Papadimitriou, Spiros; Faloutsos, Christos; Jan 2001; 21 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N66001-00-1-8936; N66001-97-C-8517
Report No.(s): AD-A459873; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459873; Avail.: CASI: A03, Hardcopy

We focus on the problem of finding patterns across two large, multidimensional datasets. For example, given feature vectors of healthy and of non-healthy patients, we want to answer the following questions: Are the two clouds of points separable? What is the smallest/largest pair-wise distance across the two datasets? Which of the two clouds does a new point (feature vector) come from? We propose a new tool, the tri-plot, and its generalization, the pq-plot, which help us answer the above questions. We provide a set of rules on how to interpret a tri-plot, and we apply these rules on synthetic and real datasets. We also show how to use our tool for classification, when traditional methods (nearest neighbor, classification trees) may fail.
DTIC
Data Mining; Information Retrieval

20070005268 Columbia Univ., New York, NY USA
Geneways for Biocomputing
Rzhetsky, Andrey; Oct 2006; 37 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8750-04-2-0123; Proj-S277
Report No.(s): AD-A459874; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459874; Avail.: Defense Technical Information Center (DTIC)

The immense growth in the volume of research literature and experimental data in the field of molecular biology calls for efficient automatic methods to capture and store information. In recent years, several groups have worked on specific problems in this area, such as automated selection of articles pertinent to molecular biology, or automated extraction of information using natural-language processing, information visualization, and generation of specialized knowledge bases for molecular biology. GeneWays is an integrated system that combines several such subtasks. It analyzes interactions between molecular substances, drawing on multiple sources of information to infer a consensus view of molecular networks. GeneWays is designed as an open platform, allowing researchers to query, review, and critique stored information.
DTIC
Extraction; Information Management; Information Retrieval; Machine Learning

20070005359 Cymfony Net, Inc., Williamsville, NY USA
Information Extraction Supported Question Answering
Srihari, Rohini; Li, Wei; Oct 15, 1999; 13 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-98-C-0043; F30602-99-C-0102
Report No.(s): AD-A460042; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA460042; Avail.: CASI: A03, Hardcopy

This paper discusses the use of our information extraction (IE) system, Textract, in the question-answering (QA) track of the recently held TREC-8 tests. One of our major objectives is to examine how IE can help IR (Information Retrieval) in applications like QA. Our study shows: (1) IE can provide solid support for QA; (2) low-level IE like Named Entity tagging is often a necessary component in handling most types of questions; (3) a robust natural language shallow parser provides a structural basis for handling questions; (4) high-level domain independent IE, i.e. extraction of multiple relationships and general events, is expected to bring about a breakthrough in QA.
DTIC
Extraction; Natural Language (Computers); Pattern Recognition

20070005367 Defense Technical Information Center, Fort Belvoir, VA USA
Strategic Plan: 2000-2005
Jan 2005; 20 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459813; No Copyright; Avail.: CASI: A03, Hardcopy

This Strategic Plan for the Defense Technical Information Center (DTIC) contains the following information: A 10-point Mission Statement; Six Critical Success Factors; External Factors/General Assumptions regarding the global information age, recognition of the importance of STI, national information infrastructure, technological growth, and resources; Visionary Concepts in the areas of information sharing and management, knowledge management and data warehousing, tools and processes, and administration; Visionary Approaches; and Strategic Goals and Objectives. The section on Strategic Goals and Objectives addresses four goals: (1) Provide excellent customer service, (2) Make access to information easy, (3) Promote the use of information to enhance decision-making and leverage the technology base, and (4) Promote excellence in human resources. For each goal, the following objectives are discussed: Basis for the goal, Metrics for measuring accomplishment, Strategic objectives, and How the goal/objectives will be achieved. The final section of the report describes the program evaluations DTIC has undergone since 1997.
DTIC
Data Management; Human Resources; Planning

20070005374 SRI International Corp., Menlo Park, CA USA
A Storage System for Scalable Knowledge Representation
Karp, Peter D; Paley, Suzanne M; Greenberg, Ira; Aug 23, 1994; 10 pp.; In English
Contract(s)/Grant(s): F30602-92-C-0115; R29-LM-05413-01A1
Report No.(s): AD-A460016; SRI-TN-547; No Copyright; Avail.: CASI: A02, Hardcopy

Twenty years of AI research in knowledge representation has produced frame knowledge representation systems (FRSs) that incorporate a number of important advances. However, FRSs lack two important capabilities that prevent them from scaling up to realistic applications: they cannot provide high-speed access to large knowledge bases (KBs), and they do not support shared, concurrent KB access by multiple users. Our research investigates the hypothesis that one can employ an existing database management system (DBMS) as a storage subsystem for an FRS, to provide high-speed access to large, shared KBs. We describe the design and implementation of a general storage system that incrementally loads referenced frames from a DBMS, and saves modified frames back to the DBMS, for two different FRSs: LOOM and THEO. We also present experimental results showing that the performance of our prototype storage subsystem exceeds that of flat files for simulated applications that reference or update up to one third of the frames from a large LOOM KB.

DTIC

Data Base Management Systems; Data Bases; Data Management; Knowledge Representation

20070005412 Naval Postgraduate School, Monterey, CA USA

Study of Attrition Documentation at the U.S. Navy Recruit Training Command

Condon, Nancy K; Eckenrode, John E; Mar 2006; 183 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460104; No Copyright; Avail.: CASI: A09, Hardcopy

This thesis examines the administrative separation process and attrition documentation as well as the characteristics of recruits who attrite from the U.S. Navy's Recruit Training Command (RTC). A random sample of 754 'retained files' from Customer Service Desk RTC was examined for attrition documentation and the information obtained was compared with attrition documentation contained in the Corporate Enterprise Training Activity Resource System (CETARS). The comparison was used to determine the accuracy of CETARS in documenting the reasons for medical and psychiatric attrition and its relationship to Separation Program Designator Codes (SPD) listed on the DD 214 discharge form. The results indicate that CETARS is 95.2 percent accurate in documenting medical reasons for attrition and 94.2 percent accurate for psychiatric reasons. It was unclear whether a relationship existed between SPD codes and CETARS in documenting attrition. The specific reasons for psychiatric attrition include the following: Personality Disorder, Adjustment Disorder, Borderline Personality Disorder, and Attention Deficit Hyperactivity Disorder. In addition to the analysis of attrition documentation, the authors analyzed data on 216,028 recruits entering RTC between fiscal year 2000 and 2004 to determine the predictors of non-psychiatric attrites versus psychiatric attrites. Logit regression found that the predictors of both types of attrition were similar.

DTIC

Accuracy; Coding; Education; Information Systems; Military Personnel; Navy

20070005426 Massachusetts Univ., Amherst, MA USA

UMass at TREC 2004: Novelty and HARD

Abdul-Jaleel, Nasreen; Allan, James; Croft, W B; Diaz, Fernando; Larkey, Leah; Li, Xiaoyan; Smucker, Mark D; Wade, Courtney; Jan 2004; 14 pp.; In English

Contract(s)/Grant(s): N66001-02-1-8903

Report No.(s): AD-A460118; No Copyright; Avail.: CASI: A03, Hardcopy

For the TREC 2004 Novelty track, UMass participated in all four tasks. Although finding relevant sentences was harder this year than last, we continue to show marked improvements over the baseline of calling all sentences relevant, with a variant of tfidf being the most successful approach. We achieve 5-9% improvements over the baseline in locating novel sentences, primarily by looking at the similarity of a sentence to earlier sentences and focusing on named entities. For the High Accuracy Retrieval from Documents (HARD) track, we investigated the use of clarification forms, fixed- and variable-length passage retrieval, and the use of metadata. Clarification form results indicate that passage level feedback can provide improvements comparable to user supplied related-text for document evaluation and outperforms related-text for passage evaluation. Document retrieval methods without a query expansion component show the most gains from related-text. We also found that displaying the top passages for feedback outperformed displaying centroid passages. Named entity feedback resulted in mixed performance. Our primary findings for passage retrieval are that document retrieval methods performed better than passage retrieval methods on the passage evaluation metric of binary preference at 12,000 characters, and that clarification forms improved passage retrieval for every retrieval method explored. We found no benefit to using variable-length passages over fixed-length passages for this corpus. Our use of geography and genre-metadata resulted in no significant changes in retrieval performance.

DTIC

Information Retrieval; Sentences; User Requirements

20070005434 Mitre Corp., Bedford, MA USA

MiTAP for Bio-Security: A Case Study

Damianos, Laurie; Ponte, Jay; Wohlever, Steve; Reeder, Florence; Day, David; Wilson, George; Hirschman, Lynette; Jan 2002; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAB07-01-C-C201

Report No.(s): AD-A460137; No Copyright; Avail.: CASI: A03, Hardcopy

MiTAP (MITRE Text and Audio Processing) is a prototype system available for monitoring infectious disease outbreaks and other global events. MiTAP focuses on providing timely, multi-lingual, global information access to medical experts and individuals involved in humanitarian assistance and relief work. Multiple information sources in multiple languages are automatically captured, filtered, translated, summarized, and categorized by disease, region, information source, person, and organization. Critical information is automatically extracted and tagged to facilitate browsing, searching, and sorting. The system supports shared situational awareness through collaboration, allowing users to submit other articles for processing, annotate existing documents, post directly to the system, and flag messages for others to see. MiTAP currently stores over one million articles and processes an additional 2000 to 10,000 daily, delivering up-to-date information to dozens of regular users.

DTIC

Infectious Diseases; Information Systems

20070005446 Michigan State Univ., East Lansing, MI USA

Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative

Weng, Juyang; McClelland, James; Pentland, Alex; Sporns, Olaf; Stockman, Ida; Sur, Mriganka; Thelen, Ether; Oct 3, 2000; 17 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460157; No Copyright; Avail.: CASI: A03, Hardcopy

A new synthesis of the neural, behavioral, and computer sciences is on the horizon. The topic that promises to unite these disparate fields is computational autonomous mental development. The term ‘mental’ refers to cognitive, behavioral and other mental skills that are exhibited by humans, higher animals and artificial systems. Computational autonomous mental development refers to the computational process by which a brain-like machine, natural or artificial, develops mental skills under the guidance of an intrinsic developmental program and through its own autonomous activities using its sensors and effectors to interact with its environment. The developmental program for an animal resides in the genes as a result of many generations of evolution; while that for a machine is initially programmed into the machine by humans but the environment changes the ways that the developmental program operates. The synthesis is inspired by new discoveries in neuroscience that highlight the exquisite plasticity of the brain with experience through infancy and adulthood, by new theories and computational modeling of human cognitive development, and by methodological and computational advances in AI and robotics that make it possible for machines to autonomously develop their own intelligence. Potentially, there are enormous benefits as a result of this synthesis: For behavioral and neural scientists, it promises a deeper, more precise and more systematic understanding about the ways our brain works through the computational study of its developmental processes. For the engineering and computer sciences, there is the vision of greatly enhanced capability for machines to interact with humans and to process information to a degree that requires kinds of machine intelligence other than those possible before.

DTIC

Artificial Intelligence; Autonomy; Extremely Low Frequencies; Memory; Neural Nets; Robotics; Software Reliability

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20070005447 SRI International Corp., Menlo Park, CA USA

A Personalized Calendar Assistant

Berry, Pauline M; Gervasio, Melinda; Uribe, Tomas E; Myers, Karen; Nitz, Ken; Jan 2004; 7 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): NBCHD-03-0010

Report No.(s): AD-A460158; No Copyright; Avail.: CASI: A02, Hardcopy

Many calendar tools have become available to organize, display, and track a user’s commitments. However, most people still spend a considerable amount of time personally organizing meetings and managing the constant changes and adjustments that must be made to their schedules. Our goal is to provide the technology necessary to manage an individual individual’s calendar. The resulting agent will let the user retain control of decisions when necessary and relinquish control to the assistant at other times. Meanwhile, the agent will be sensitive to the user user’s wishes and preferences. The key elements in our approach are the creation of a process framework that captures possible interactions with users and other agents, learning technology to capture the user user’s preferences, and advisability to enable direct instruction by the user at various levels of

abstraction. As the system improves its model of the user over time, reliance on user interaction will decrease.
DTIC
Calendars; Decision Making; Organizations; Scheduling

20070005450 Colorado Univ., Boulder, CO USA
Enhancing Incremental Learning Processes With Knowledge-Based Systems
Fischer, Gerhard; Lemke, Andreas; Nieper-Lemke, Helga; Mar 1988; 32 pp.; In English
Contract(s)/Grant(s): N00014-85-K-0842
Report No.(s): AD-A460163; CU-CS-392-88; No Copyright; Avail.: CASI: A03, Hardcopy

The purpose of this project was to investigate the enhancement of incremental learning processes with knowledge-based support systems. The research was carried out in the context of learning to use high- functionality computer systems. As a basis for the design of support systems, the structure of learning spaces was studied. The model of increasingly complex microworlds was found to adequately describe the relationships between the units of expertise. The usability of systems can be increased by reducing and by enhancing learning processes. Construction sets and design environments are support systems which reduce learning processes. Two prototypical systems (WIDES and TRIKIT) demonstrate techniques for achieving this goal. Critics are task-oriented intelligent systems to enhance learning processes. As an instance of a critic, the LisPCRiTic was designed and implemented. It contains knowledge about FRANzLIsP which is utilized to make programs either more cognitively efficient or more machine efficient. The LisPCRmc supports learning by suggesting improvements and explaining relevant concepts.
DTIC
Expert Systems; Information Systems; Knowledge Based Systems; Learning

20070005464 Mitre Corp., Colorado Springs, CO USA
Information Feasability: Using the Concept for Planning the Information Needs of Deploying Forces
Beckner, Stanley G; Jun 2000; 30 pp.; In English
Contract(s)/Grant(s): F19628-00-C-001
Report No.(s): AD-A460188; MITRE-TR-00B0000031; No Copyright; Avail.: CASI: A03, Hardcopy

Information superiority seeks to ensure that force elements receive the right information at the right time to optimally influence the outcome of an operation. Currently the ad hoc planning for force information exchanges does not optimally support early dominance and rapid mission success. This paper proposes that Information Feasibility be used in advanced planning of C2 information distribution requirements. Information feasibility analysis is a concept that treats information advanced planning requirements in a way that is very similar to that of other force deployment needs. An example is provided using a set of validated Information Exchange Requirements (IERs). The paper concludes that an Information Plan derived from Information Feasibility analysis and based on prioritized IERs, is the way to improve advance information planning, especially in a coalition environment where predeployment planning is often limited.
DTIC
Deployment

20070005467 Massachusetts Univ., Amherst, MA USA
UMass at TREC 2003: HARD and QA
AbdulJaleel, Nasreen; Corrada-Emmanuel, Andres; Li, Qi; Liu, Xiaoyong; Wade, Courtney; Allan, James; Jan 2003; 12 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N66001-02-1-8903; MDA904-01-C-0984
Report No.(s): AD-A460192; No Copyright; Avail.: CASI: A03, Hardcopy

The Center for Intelligent Information Retrieval (CIIR) at UMass Amherst participated in two tracks for TREC 2003: High Accuracy Retrieval from Documents (HARD) and Question Answering (QA). In the HARD track, we developed document metadata to correspond to query metadata requirements; implemented clarification forms based on query expansion, passage retrieval, and clustering; and retrieved variable length passages deemed most likely to be relevant. This work is discussed at length in Section 1. In the QA track, we focused on retrieving passages that were likely to contain the answer to the question. In the QA track, we developed a dynamic passaging retrieval system to identify passages likely to contain answers. CIIR last participated in the QA task in TREC 9 (2000). At that time we fielded the Marsha system [11]. This system was based on an INQUERY document retrieval engine followed by the application of a series of heuristics rules to identify 250-byte long passages in the retrieved documents that were likely to contain the desired answers. This year's passage sub-task

in the QA track has allowed us to participate once again utilizing our current approach to passage retrieval with language models. We developed a dynamic passaging system that retrieved document passages based on the simplest implementation of language models: cross-entropy between bag-of-word models for a question and a candidate passage.
DTIC
Accuracy; Information Retrieval

20070005474 Dragon Systems, Inc., Newton, MA USA
Rapid Match Training for Large Vocabularies
Gillick, Larry; Peskin, Barbara; Roth, Robert; Jan 1992; 6 pp.; In English
Contract(s)/Grant(s): N00039-86-C-0307
Report No.(s): AD-A460284; No Copyright; Avail.: CASI: A02, Hardcopy

This paper describes a new algorithm for building rapid match models for use in Dragon's continuous speech recognizer. Rather than working from a single representative token for each word, the new procedure works directly from a set of trained hidden Markov models. By simulated traversals of the HMMs, we generate a collection of sample tokens for each word which are then averaged together to build new rapid match models. This method enables us to construct models which better reflect the true variation in word occurrences and which no longer require the extensive adaptation needed in our original method. In this preliminary report, we outline this new procedure for building rapid match mod- els and report results from initial testing on the Wall Street Journal recognition task.
DTIC
Education

20070005477 Dragon Systems, Inc., Newton, MA USA
Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems
Baker, James; Baker, Janet; Bamberg, Paul; Bishop, Kathleen; Gillick, Larry; Helman, Vera; Huang, Zezhen; Ito, Yoshiko; Lowe, Stephen; Peskin, Barbara; Roth, Robert; Scattone, Francesco; Jan 1992; 7 pp.; In English
Contract(s)/Grant(s): N00039-86-C-0307
Report No.(s): AD-A460288; No Copyright; Avail.: CASI: A02, Hardcopy

In this paper we present some of the algorithm improvements that have been made to Dragon's continuous speech recognition and training programs, improvements that have more than halved our error rate on the Resource Management task since the last SLS meeting in February 1991. We also report the 'dry run' results that we have obtained on the 5000-word speaker-dependent Wall Street Journal recognition task, and outline our overall research strategy and plans for the future. In our system, a set of output distributions, known as the set of PELs (phonetic elements), is associated with each phoneme. The HMM for a PIC (phoneme-in-context) is represented as a linear sequence of states, each having an output distribution chosen from the set of PELs for the given phoneme, and a (double exponential) duration distribution. In this paper we report on two methods of acoustic modeling and training. The first method involves generating a set of (unimodal) PELs for a given speaker by clustering the hypothetical frames found in the spectral models for that speaker, and then constructing speaker-dependent PEL sequences to represent each PIC. The 'spectral model' for a PIC is simply the expected value of the sequence of frames that would be generated by the PIC. The second method represents the probability distribution for each parameter in a PEL as a mixture of a fixed set of unimodal components, the mixing weights being estimated using the EM algorithm. In both models we assume that the parameters axe statistically independent.
DTIC
Sentences; Streets; Walls

20070005489 Naval Postgraduate School, Monterey, CA USA
The Development of a Logistical Body of Knowledge for the Department of Defense
Yardley, Thomas E; Pavlik, David E; Curl, Gregory A; Dec 2006; 45 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460315; No Copyright; Avail.: CASI: A03, Hardcopy

The purpose of this MBA Project was to identify and provide a basic but comprehensive overview of current logistical and supply chain management practices relevant to the Department of Defense. This project was conducted with the assistance of Naval Postgraduate School professors versed in Transportation, Logistical, and Financial Management disciplines. Presented in an annotated bibliography format, the project identifies concepts, theories, articles, journals, and perspectives that will be useful to all Department of Defense users. The objective is to examine the logistics culture from these perspectives

and provide a tool allowing a standardized level of knowledge subsequently generating a dynamic pool of knowledge encompassing logistical theories and qualitative decision-making tools.
DTIC
Defense Program; Information Management; Logistics

20070005492 SRI International Corp., Menlo Park, CA USA
A Team User's Guide
Archbold, Armar A; Grosz, Barbara; Sagalowicz, Daniel; Dec 21, 1981; 68 pp.; In English
Contract(s)/Grant(s): N00039-80-C-0645; DARPA ORDER-3988
Report No.(s): AD-A460318; TN-254; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available

Data Bases; Information Systems

20070005493 Naval Postgraduate School, Monterey, CA USA
A Critical Analysis of the Acquisition Review Journal: Are We in Step with the Field?
Miranda, Cristina M; Spann, Cheronda V; Dec 2006; 103 pp.; In English; Original contains color illustrations
Report No.(s): AD-A460320; No Copyright; Avail.: CASI: A06, Hardcopy

The purpose of this study is to provide contributing authors with an understanding of the trends in article submission to the Acquisition Review Journal (ARJ) with regard to the types of research performed, research design, and data analysis. This research will provide future contributors with insight that will improve both the quality of the ARJ and future research for the Acquisition Corps. It will also provide guidance and recommendations for future research articles within the ARJ. This study analyzed and classified 233 articles that were published in the ARJ over the last 13 years (1994-2006). Content and statistical analyses were performed on the themes, research types, research designs, and data analysis methods employed. Moreover, trends such as educational and institutional affiliations of contributing authors were also reviewed. The ARJ has shown some distinctive trends, which are reflected in its publication of a number of qualitative studies; however, it has also shown progress in the number of published quantitative studies. The academe and practitioners contributions remained steady, while civilian contributions have been rising. These trends are in line with current recommendations of the research community. For a relatively new journal, such trends are a good representation of a growing community.
DTIC
Acquisition; Statistical Analysis

20070005494 SRI International Corp., Menlo Park, CA USA
The Database as Model: A Metatheoretic Approach
Konolige, Kurt; Sep 1981; 40 pp.; In English
Contract(s)/Grant(s): N00030-80-C-0645; N00039-80-C-0645
Report No.(s): AD-A460323; No Copyright; Avail.: CASI: A03, Hardcopy

This paper presents a method of formally representing the information that is available to a user of a relational database. The intended application area is deductive question-answering systems that must access an existing relational database. To respond intelligently to user inquiries, such systems must have a more complete representation of the domain of discourse than is generally available in the tuple sets of a relational database. Given this more expressive representation, the problem arises of how to reconcile the information present in the database with the domain representation so that database queries can be derived to answer the user's inquiries. In this paper, the author takes the formal approach of describing a relational database as the model of a first-order language. Another first-order language, the metalanguage, is used both to represent the domain of discourse and to describe the relationship of the database to the domain. The formal advantages of this approach are presented and contrasted with other work in this area.
DTIC
Artificial Intelligence; Data Bases; Information Retrieval; Interrogation; Languages; Natural Language (Computers); Relational Data Bases

20070005499 National Defense Univ., Washington, DC USA
Information Warfare and International Law
Greenberg, Lawrence T; Goodman, Seymour E; Soo Hoo, Kevin J; Jan 1998; 60 pp.; In English
Report No.(s): AD-A460329; No Copyright; Avail.: CASI: A04, Hardcopy

The development of ‘information warfare’ presents international legal issues that will complicate nations’ efforts both to execute and to respond to certain information warfare attacks, specifically those using computers, telecommunications, or networks to attack adversary information systems. Some legal constraints will certainly apply to information warfare, either because the constraints explicitly regulate particular actions, or because more general principles of international law govern the effects of those actions. Nevertheless, the novelty of certain information warfare techniques may remove them from application of established legal categories. Furthermore, the ability of signals to travel across international networks and affect systems in distant countries conflicts with the longstanding principle of national, territorial sovereignty. First, it has not been established that information attacks, particularly when they are not directly lethal or physically destructive, constitute the use of ‘force’ or ‘armed attack’ under such provisions as the United Nations Charter. Second, it is equally unclear whether some of the damage that information warfare attacks could inflict, as by disrupting government or private databases and systems, is the sort of damage that international humanitarian law is intended to restrain. Finally, where attacks can be executed across international networks, the USA (among others) may need to rely upon foreign assistance in identifying and responding to those who have attacked it. The ambiguous state of international law regarding information warfare may leave space for the USA to pursue information warfare activities. Conversely, it may permit adversaries to attack the USA and its systems. This monograph discusses several, nonexclusive international legal approaches that the USA may pursue to protect its systems or clarify its offensive, defensive, and retaliatory options.
DTIC
International Law; Responses; United States; Warfare

20070005504 Engineering Technologies Associates, Inc., Ellicott City, MD USA
Remedial Investigation and Feasibility Study of the Defense Property Disposal Office, Fort George G. Meade, Maryland. Final Quality Control Plan
May 1995; 108 pp.; In English
Contract(s)/Grant(s): DACA31-92-D-0045-0010
Report No.(s): AD-A460338; No Copyright; Avail.: CASI: A06, Hardcopy

This Quality Control Plan (QCP) was prepared by Engineering Technologies Associates, Inc. (ETA) under Contract No. DACA31-92-D-0045, Delivery Order 0010, for the U. S. Army Environmental Center (USAEC) to address the Remedial Investigation and Feasibility Study of the Defense Reutilization and Marketing Office (DRMO) Yard at Fort Meade, formerly referred to as the Defense Property and Disposal Office (DPDO). This Quality Control Plan (QCP) has been developed in accordance with the USA Toxic and Hazardous Materials Agency (USATHAMA) Geotechnical Requirements, and the USATHAMA Quality Assurance Program and the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. This QCP for the RI/FS at the DRMO Yard has been developed to comply with the requirements of the USAEC Quality Assurance Program, USATHAMA PAM 11-41, Revision No. 0, January 1990 and appropriate EPA Region III Quality Assurance Guidance as applicable. Our subcontracted laboratory will be DataChem Laboratories, of Salt Lake City, Utah. They will provide chemical analyses of environmental samples collected during this investigation. Therefore the QA Program Plan from DataChem Laboratories is included as Attachment A. ETAs corporate policy includes a commitment to a high standard of quality in the work it performs for and delivers to its clients. This policy is reflected in the quality of our general operating policies and procedures and the quality of the workmanship that is produced for our clients. We expect the same level of commitment to quality from our subcontractors. The objective of the USAEC Quality Assurance Program is to establish a QA system and proper QC procedures associated with the Quality Control Plan for specific projects, such as the Remedial Investigation and Feasibility Study at the DRMO Yard at Fort Meade.
DTIC
Environmental Surveys; Feasibility; Gas Chromatography; Quality Control

20070005507 Massachusetts Inst. of Tech., Cambridge, MA USA
Experiments in Evaluating Interactive Spoken Language Systems
Polifroni, Joseph; Hirschman, Lynette; Seneff, Stephanie; Zue, Victor; Jan 1992; 7 pp.; In English
Contract(s)/Grant(s): N00014-89-J-1332
Report No.(s): AD-A460343; No Copyright; Avail.: CASI: A02, Hardcopy

As the DARPA spoken language community moves towards developing useful systems for interactive problem solving, we must explore alternative evaluation procedures that measure whether these systems aid people in solving problems within the task domain. In this paper, we describe several experiments exploring new evaluation procedures. To look at end-to-end evaluation, we modified our data collection procedure slightly in order to experiment with several objective task completion measures. We found that the task completion time is well correlated with the number of queries used. We also explored log

file evaluation, where evaluators were asked to judge the clarity of the query and the correctness of the response based on examination of the log file. Our results show that seven evaluators were unanimous on more than 80% of the queries, and that at least 6 out of 7 evaluators agreed over 90% of the time. Finally, we applied these new procedures to compare two systems, one system requiring a complete parse and the other using the more flexible robust parsing mechanism. We found that these metrics could distinguish between these systems: there were significant differences in ability to complete the task, number of queries required to complete the task, and score (as computed through a log file evaluation) between the robust and the non-robust modes.
DTIC
Data Acquisition; Evaluation; Linguistics; Natural Language Processing; Problem Solving; Speech; System Effectiveness

20070005513 University of Southern California, Marina del Rey, CA USA
The Rate of Progress in Natural Language Processing
Sondheimer, Norman K; Jan 1987; 5 pp.; In English
Contract(s)/Grant(s): FQ8671-84-01007; MDA903-81-C-0335
Report No.(s): AD-A460356; No Copyright; Avail.: CASI: A01, Hardcopy

The rate of progress in natural language processing has been disappointing to many, including myself. It is not just that the popular press has had overblown expectations, but that we at this meeting have. The consequences of these errors could be severe. Hopefully, this short note will give an accurate evaluation of our rate of progress, identify what some of the problems have been, and present some reasonable suggestions on what can be done to improve the situation. Given that we want to take our ideas down the chain from theoretical research to empirical study and beyond and that natural language is an extremely difficult task, how can we proceed? There is only one answer: work within our current limits. Let's treat our work as that of successive approximations. Let us forget about the unexplored problems for the time being. Let us see what we can really do with the proposals we have that seem to work. Basically, let us emphasize building systems and full-scale components for a while. For example, why don't a group of us take the best parser, the best semantic interpreter, the best generator, the best inference system, etc., and tie them together? Then let's pick a domain of discourse and make them work for more than a few sentences. Let's beat on them until they work for as much of language as they appear capable. While we are at it, let's make the system as fast, as robust, as portable, as maintainable, etc., as we possibly can. Similarly, let's beat on individual components in the same way. I know there is no guarantee this approach will produce a useful system or component. But even if we fail to produce something worth going further with, we will have learned a lot about what works and what doesn't. If those results are not allowed to be lost, the next effort can do better. Of course, a problem with this approach lies in the source of our funds.
DTIC
Data Bases; Data Processing; Linguistics; Natural Language (Computers); Natural Language Processing; Progress; Systems Engineering

20070005525 Air Force Academy, CO USA
Information Warfare Arms Control: Risks and Costs
Thom, Maxie C; Mar 2006; 76 pp.; In English
Report No.(s): AD-A460393; INSS-OP-63; No Copyright; Avail.: CASI: A05, Hardcopy

Since the end of the 1991 Gulf War, information warfare has taken a prominent role in transforming the military as envisioned in Joint Vision 2010. However, due to the rapid changes in information technologies and the low cost, wide availability and high payoff of information warfare weapons, some have seen it as a destabilizing influence and have called for international arms control agreements to govern its use. Although the international legal system and the modern concept of arms control were able to provide for national and international collective security during the Cold War, information warfare presents many challenges that question their viability. The most significant challenges are to the international legal system, which include undermining the ordering principle of the post-Westphalian international system. Despite these challenges, an information warfare arms control regime is still achievable; however, at potentially significant costs and risks. Although some of these costs would be similar to previous nuclear, biological, and chemical weapons arms control agreements, the lack of available data makes it difficult to determine the expected costs with any degree of accuracy. In addition, some of these costs cannot be expressed in budgetary terms; therefore, they are presented as risks and include increased proliferation, intelligence loss, cheating, and a false sense of security. Since there are also political risks by not becoming a signatory to international agreements on this issue, the U.S. would be best served by staying engaged in the discourse to shape the norm for information warfare in the international arena.
DTIC
Costs; Risk; Threat Evaluation; Warfare

83
ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

20070004622 Naval Postgraduate School, Monterey, CA USA
Public-Private Partnerships for Government Financing, Controlling Risk, and Value-for-Money: The UK Experience
Sep 1, 2006; 59 pp.; In English
Report No.(s): AD-A459811; NPS-GSBPP-06-020; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available

Finance; Risk; Governments

20070004672 Naval Postgraduate School, Monterey, CA USA
Using Public-Private Partnerships and Energy Savings Contracts to Fund DoD Mobile Assets
Sep 30, 2006; 71 pp.; In English
Report No.(s): AD-A459747; NPS-GSBPP-06-021; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available

Energy Conservation; Contracts

20070004675 Naval Postgraduate School, Monterey, CA USA
Lean Six Sigma for Reduced Cycle Costs and Improved Readiness
Sep 30, 2006; 57 pp.; In English
Report No.(s): AD-A459746; NPS-GSBPP-06-019; No Copyright; Avail.: CASI: A04, Hardcopy

No abstract available

Cost Reduction; Cycles; Improvement; Upgrading

84
LAW, POLITICAL SCIENCE AND SPACE POLICY

Includes aviation law; space law and policy; international law; international cooperation; and patent policy.

20070003690 NASA Johnson Space Center, Houston, TX, USA
Mission Success and Environmental Protection: Orbital Debris Considerations
Johnson, Nicholas; [2007]; 22 pp.; In English; Expendable Launch Vehicle Payload Safety, 5-7 Feb. 2007, Santa Barbara, CA, USA; Original contains color illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003690; Avail.: CASI: A03, Hardcopy

The current U.S. National Space Policy specifically calls on U.S. Government entities ‘to follow the USA Government Orbital Debris Mitigation Standard Practices, consistent with mission requirements and cost effectiveness, in the procurement and operation of spacecraft, launch services, and the operation of tests and experiments in space. Early assessment (pre-PDR) of orbital debris mitigation compliance is essential to minimize development impacts. Orbital debris mitigation practices today are the most effective means to protect the near-Earth space environment for future missions.

Derived from text

Space Debris; Mission Planning; Aerospace Environments; Spacecraft Launching; Space Law

85
TECHNOLOGY UTILIZATION AND SURFACE TRANSPORTATION

Includes aerospace technology transfer; urban technology; surface and mass transportation. For related information see also *03 Air Transportation and Safety, 16 Space Transportation and Safety*, and *44 Energy Production and Conversion*. For specific technology transfer applications see also the category where the subject is treated.

20070003611 Army Research Development and Engineering Command, Warren, MI, USA
A Lesson from the Past for Safer Future Tactical Vehicles
May 8, 2003; 15 pp.; In English
Report No.(s): AD-A459799; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Tactics; Surface Vehicles

20070003864 Army Tank-Automotive and Armaments Command, Warren, MI USA
Present and Future Diagnostics and Prognostics of Ground Combat Vehicles
Jul 9, 2003; 7 pp.; In English
Report No.(s): AD-A459548; TACOM-13903; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Combat; Surface Vehicles; Transportation

20070004679 Oak Ridge National Lab., TN USA
Supplemental Release Limits for the Directed Reuse of Steel in Road Barriers and Lead in Shielding Products by the Department of Energy
Coleman, R. L.; Bogard, J. S.; Apr. 2005; 58 pp.; In English
Report No.(s): DE2006-886001; No Copyright; Avail.: Department of Energy Information Bridge

The DOE National Center of Excellence for Metals Recycle (NMR) proposes to define and implement a complex-wide directed reuse strategy for surplus radiologically impacted lead (Pb) and steel as part of the U.S. Department of Energy's commitment to the safe and cost-effective recycle or reuse of excess materials and equipment across the DOE complex. NMR will, under this proposal, act on behalf of the DOE Office of Environmental Management, Office of Technical Program Integration (specifically EM-22), as the Department's clearinghouse for DOE surplus lead, steel and products created from these materials by developing and maintaining a cost-effective commercially-based contaminated lead and steel recycle program. It is NMR's intention, through this directed reuse strategy, to mitigate the adverse environmental and economic consequences of managing surplus lead and steel as a waste within the complex. This approach promotes the safe and cost-effective reuse of scrap metals in support of the Department's goals of resource utilization, energy conservation, pollution prevention and waste minimization. This report discusses recommendations for supplemental radiological release limits for the directed reuse of contaminated lead and steel by the DOE within the nuclear industry.
NTIS

Lead (Metal); Radiation Shielding; Roads; Shielding; Steels

20070004923 Army Tank-Automotive Research and Development Command, Warren, MI USA
Ground Mobility M&S Technology Development and Application
Sep 20, 2004; 11 pp.; In English
Report No.(s): AD-A459556; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Mobility; Technology Utilization; Simulation; Models

88
SPACE SCIENCES (GENERAL)

Includes general research topics related to the natural space sciences. For specific topics in space sciences see *categories 89 through\f93.*

20070005033 NASA Goddard Space Flight Center, Greenbelt, MD, USA
MEMS Microshutter for James Webb Space Telescope
Li, Mary J.; Beamwsderfer, Michael; Babu, Sachi; Bajikar, Sateesh; Ewin, Audrey; Franz, Dave; Hess, Larry; Hu, Ron; Jhabvala, Murzy; Kelly, Dan; King, Todd; Kletetschkar, Gunther; Kutyrev, Alexander; Lynch, Barney; Moseley, Harvey; Mott, Brent; Oh, Lance; Rapchum, Dave; Ray, Chris; Sappington, Carol; Silverberg, Robert; Smith, Wayne; Snodgrass, Steve; Steptoe-Jackson, Rosalind; Valeriano; [2006]; 1 pp.; In English; Smart Materials, Nano, and Micro Smart Systems, 10-13 Dec. 2006, Adelaide, Australia; No Copyright; Avail.: Other Sources; Abstract Only

MEMS microshutter arrays are being developed at NASA Goddard Space Flight Center for use as an aperture array for a Near-Infrared Spectrometer (NirSpec). The instruments will be carried on the James Webb Space Telescope (JWST), the next generation of space telescope after Hubble Space Telescope retires. The microshutter arrays are designed for the selective transmission of light with high efficiency and high contrast, Arrays are close-packed silicon nitride membranes with a pixel size of 100x200 microns. Individual shutters are patterned with a torsion flexure permitting shutters to open 90 degrees with a minimized mechanical stress concentration. Light shields are made on to each shutter for light leak prevention so to enhance

optical contrast, Shutters are actuated magnetically, latched and addressed electrostatically. The shutter arrays are fabricated using MEMS technologies.
Author
James Webb Space Telescope; Apertures; Infrared Spectrometers; Microelectromechanical Systems; Spaceborne Telescopes; Silicon Nitrides; Membranes

20070005043 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Titan Orbiter with Aerorover Mission (TOAM)
Sittler, Edward C.; Cooper, J. F.; Mahaffey, P; Esper, J.; Fairbrother, D.; Farley, R.; Pitman, J.; Kojiro, D. R.; [2006]; 1 pp.; In English; 38th Annual Division of Planetary Sciences Meeting, 9-13 Oct. 2006, Pasadena, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

We propose to develop a new mission to Titan called Titan Orbiter with Aerorover Mission (TOAM). This mission is motivated by the recent discoveries of Titan, its atmosphere and its surface by the Huygens Probe, and a combination of in situ, remote sensing and radar mapping measurements of Titan by the Cassini orbiter. Titan is a body for which Astrobiology (i.e., prebiotic chemistry) will be the primary science goal of any future missions to it. TOAM is planned to use an orbiter and balloon technology (i.e., aerorover). Aerobraking will be used to put payload into orbit around Titan. The Aerorover will probably use a hot air balloon concept using the waste heat from the MMRTG approx. 500 watts. Orbiter support for the Aerorover is unique to our approach for Titan. Our strategy to use an orbiter is contrary to some studies using just a single probe with balloon. Autonomous operation and navigation of the Aerorover around Titan will be required, which will include descent near to the surface to collect surface samples for analysis (i.e., touch and go technique). The orbiter can provide both relay station and GPS roles for the Aerorover. The Aerorover will have all the instruments needed to sample Titan’s atmosphere, surface, possible methane lakes-rivers, use multi-spectral imagers for surface reconnaissance; to take close up surface images; take core samples and deploy seismometers during landing phase. Both active and passive broadband remote sensing techniques will be used for surface topography, winds and composition measurements.
Author
Titan; Autonomous Navigation; Cassini Mission; Core Sampling; Mariner Mark 2 Spacecraft; Remote Sensing; Aerobraking; Huygens Probe

20070005152 NASA Langley Research Center, Hampton, VA, USA
Electron Beam Freeform Fabrication in the Space Environment
Hafley, Robert A.; Taminger, Karen M. B.; Bird, R. Keith; [2001]; 9 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 706801.04.15.01.03; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005152; Avail.: CASI: A02, Hardcopy

The influence of reduced gravitational forces (in space and on the lunar or Martian surfaces) on manufacturing processes must be understood for effective fabrication and repair of structures and replacement parts during long duration space missions. The electron beam freeform fabrication (EBF3) process uses an electron beam and wire to fabricate metallic structures. The process efficiencies of the electron beam and the solid wire feedstock make the EBF3 process attractive for use in-space. This paper will describe the suitability of the EBF3 process in the space environment and will highlight preliminary testing of the EBF3 process in a zero-gravity environment.
Author
Weightlessness; Electron Beams; Lunar Surface; Fabrication; Replacing; Aerospace Environments; Gravitational Fields

89
ASTRONOMY

Includes observations of celestial bodies; astronomical instruments and techniques; radio, gamma-ray, x-ray, ultraviolet, and infrared astronomy; and astrometry.

20070003587 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Five Millennium Canon of Solar Eclipses: -1999 to +3000 (2000 BCE to 3000 CE)
Espenak, Fred; Meeus, Jean; October 2006; 660 pp.; In English
Report No.(s): NASA/TP-2006-214142; Rept-2005-02440-1; Copyright; Avail.: CASI: C01, CD-ROM: A99, Hardcopy

During 5,000-year period from -1999 to +3000 (2000BCE to 3000CE), Earth will experience 11,898 eclipses of the Sun.

The statistical distribution of eclipse types for this interval is as follows: 4,200 partial eclipses, 3956 annular eclipses, 3173 total eclipses,and 569 hybrid eclipses. Detailed global maps for each of the 11,898 eclipses delineate the geographic regions of visibility for both the penumbral (partial) and umbral or antumbral (total, annular, or hybrid) phases of every event. Modern political borders are plotted to assist in the determination of eclipse visibility. The uncertainty in Earth's rotational period expressed in the parameter (delta)T and its impact on the geographic visibility of eclipses in the past and future is discussed.
Author
Eclipses; Penumbras; Statistical Distributions; Sun

20070004788 NASA Goddard Space Flight Center, Greenbelt, MD, USA
GRO J1655-40: Early Stages of the 2005 Outburst
Shaposhnikov, N.; Swank, Jean; Shrader, C. R.; Rupen, M.; Beckmann, V.; Markwardt, C. B.; Smith, D. A.; [2007]; 42 pp.; In English; Copyright; Avail.: CASI: A03, Hardcopy

The black-hole X-ray binary transient GRO J1655-40 underwent an outburst beginning in early 2005. We present the results of our multi-wavelength observational campaign to study the early outburst spectral and temporal evolution, which combines data from X-ray (RXTE, INTEGRAL), radio (VLA) and optical (ROTSE, SMARTS) instruments. During the reported period the source left quiescence and went through four major accreting black hole states: low-hard, hard intermediate, soft intermediate and high-soft. We investigated dipping behavior in the RXTE band and compare our results to the 1996-1997 case, when the source was predominantly in the high-soft state, finding significant differences. We consider the evolution of the low frequency quasi-periodic oscillations and find that the frequency strongly correlates with the spectral characteristics, before shutting off prior to the transition to the high-soft state. We model the broad-band high-energy spectrum in the context of empirical models, as well as more physically motivated thermal and bulk-motion Comptonization and Compton reflection models. RXTE and INTEGRAL data together support a statistically significant high energy cut-off in the energy spectrum at approximately equal to 100 - 200 keV during the low-hard state. The RXTE data alone also show it very significantly during the transition, but cannot see one in the high-soft state spectra. We consider radio, optical and X-ray connections in the context of possible synchrotron and synchrotron self-Compton origins of X-ray emission in low-hard and intermediate states. In this outburst of GRO J1655-40, the radio flux does not rise strongly with the X-ray flux.
Author
Black Holes (Astronomy); X Ray Binaries; Radio Observation; Very Large Array (VLA); Broadband

20070004989 Lawrence Livermore National Lab., Livermore, CA USA
AO Group Annual Report
Olivier, S.; Nov. 11, 2005; 14 pp.; In English
Report No.(s): DE2006-889452; UCRL-TR-217011; No Copyright; Avail.: National Technical Information Service (NTIS)

The Adaptive Optics (AO) Group in I Division develops and tests a broad range of advanced wavefront control technologies. Current applications focus on: Remote sensing, High power lasers, Astronomy, and Human vision. In the area of remote sensing, the AO Group leads a collaborative effort with LLNL's Nonproliferation, Arms Control & International Security (NAI) Directorate on Enhanced Surveillance Imaging. The ability to detect and identify individual people or vehicles from long-range is an important requirement for proliferation detection and homeland security. High-resolution imaging along horizontal paths through the atmosphere is limited by turbulence, which blurs and distorts the image. For ranges over (approx.) one km, visible image resolution can be reduced by over an order of magnitude. We have developed an approach based on speckle imaging that can correct the turbulence-induced blurring and provide high resolution imagery. The system records a series of short exposure images which freeze the atmospheric effects. We can then estimate the image magnitude and phase using a bispectral estimation algorithm which cancels the atmospheric effects while maintaining object information at the diffraction limit of the imaging system.
NTIS
Adaptive Optics; Wave Fronts; Trajectory Control

20070005045 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Dynamics of the DAZd Disks
Kuchner, Marc; [2006]; 1 pp.; In English; Cambridge University, 16 Aug. 2006, Cambridge, UK; No Copyright; Avail.: Other Sources; Abstract Only

New observations of DAZ dwarfs suggest that many of these stars---the DAZd subclass---host rings of debris. We will discuss the minerology and dynamics ofthese rings as inferred from models of new mid-infrared spectra and photometry raken with the Spitzer space telescope, I will show that rhe DAZd rings do not need to be recently supplied by a single comet; they can survive for approx. 1 Gyr.

Author

Debris; Dwarf Stars; Mineralogy; Dynamics

20070005048 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Future Gamma-Ray Observations of Pulsars and their Environments

Thompson, David J.; [2006]; 26 pp.; In English; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005048; Avail.: CASI: A03, Hardcopy

Pulsars and pulsar wind nebulae seen at gamma-ray energies offer insight into particle acceleration to very high energies under extreme conditions. Pulsed emission provides information about the geometry and interaction processes in the magnetospheres of these rotating neutron stars, while the pulsar wind nebulae yield information about high-energy particles interacting with their surroundings. During the next decade, a number of new and expanded gamma-ray facilities will become available for pulsar studies, including Astro-rivelatore Gamma a Immagini LEggero (AGILE) and Gamma-ray Large Area Space Telescope (GLAST) in space and a number of higher-energy ground-based systems. This review describes the capabilities of such observatories to answer some of the open questions about the highest-energy processes involving neutron stars.

Author

Gamma Ray Telescopes; Pulsars; Gamma Ray Observatory; Stellar Atmospheres

20070005089 NASA Goddard Space Flight Center, Greenbelt, MD, USA

The Swift/BAT Hard X-ray Survey

Tueller, Jack; Markwardt, C. B.; Mushotzky, R. F.; Barthelmy, S. D.; Gehrels, N.; Krimm, A.; Skinner, G. K.; Falcone, A.; Kennea, J. A.; [2006]; 1 pp.; In English; HEAD - High Energy Astrophysics Division, 3-7 Oct. 2006, San Francisco, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

The BAT instrument on Swift is a wide field (70 deg. ‘100 deg.) coded aperture instrument with a CdZnTe detector array sensitive to energies of 14-200 keV. Each day, the BAT survey typically covers 60% of the sky to a detection limit of 30 millicrab. BAT makes hard X-ray light curves of similar sensitivity and coverage to the X-ray light curves from XTE/ASM, but in an energy range where sources show remarkably different behavior. Integrating the BAT data produces an all sky map with a source detection limit at 15 months of a few 10(exp -11) ergs per square centimeter per second, depending on the exposure. This is the first uniform all-sky survey at energies high enough to be unaffected by absorption since HEAO 1 in 1977-8. BAT has detected greater than 200 AGN and greater than 180 galactic sources. At high galactic latitudes, the BAT sources are usually easy to identify, but many are heavily absorbed and there are a few quite surprising identifications. The BAT selected galaxies can be used to calculate LogN/LogS and the luminosity function for AGN which are complete and free from common systematics. Several crucial parameters for understanding the cosmic hard x-ray background are now determined.

Author

X Rays; Telescopes; Gamma Ray Bursts; Swift Observatory; Sky Surveys (Astronomy)

20070005132 Stanford Linear Accelerator Center, CA, USA, Rice Univ., Houston, TX, USA

Lensing Signals in the Hubble Ultra-Deep Field Using All 2nd-Order Shape Deformations

Irwin, J.; Shmakova, M.; Anderson, J.; Jul. 2006; 14 pp.; In English

Report No.(s): DE2006-887076; SLAC-PUB-11940; No Copyright; Avail.: National Technical Information Service (NTIS)

The long exposure times of the HST Ultra-Deep Field plus the use of an empirically derived position-dependent PSF, have enabled us to measure a cardioid/displacement distortion map coe-cient as well as improving upon the sextupole map coe-cient. We conrmed that curved background galaxies are clumped on the same angular scale as found in the HST Deep Field North. The new cardioid/displacement map coefficient is strongly correlated to a production of the sextupole and quadrupole coe-cients. One would expect to see such a cor relation from ts to background galaxies with quadrupole and sextupole moments. Events that depart from this correlation are expected to arise from map coefficient changes due to lensing, and several galaxy subsets selected using this criteria are indeed clumped.

NTIS

Deformation; Displacement; Shapes; Telescopes

20070005210 Naval Research Lab., Washington, DC USA

The Scientific Program of the U.S. Naval Research Laboratory

Jul 1, 1958; 33 pp.; In English

Report No.(s): AD-A459675; NRL-5175; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA459675; Avail.: CASI: A03, Hardcopy

No abstract available

Astronomy; Astrophysics; Electricity

90
ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

20070003684 California Univ., San Diego, La Jolla, CA, USA

Black Hole Spectral States and Physical Connections

Tomsick, John A.; Advances in Space Research; 2006; ISSN 0273-1177; Volume 38, pp. 2805-2809; In English; Original contains color illustrations

Contract(s)/Grant(s): NNG04GP08G; NAG5-13055; NNG04GA49G; NAG5-12703; Copyright; Avail.: Other Sources

The dramatic changes seen in the X-ray spectral and timing properties of accreting black hole candidates (BHCs) provide important clues about the accretion and jet formation processes that occur in these systems. Dividing the different source behaviors into spectral states provides a framework for studying BHCs. To date, there have been three main classification schemes with Luminosity-based, Component-based, or Transition-based criteria. The canonical, Luminosity-based criteria and physical models that are based on this concept do not provide clear explanations for several phenomena, including hysteresis of spectral states and the presence of jets. I discuss the re-definitions of states, focusing on an application of the Component-based states to more than 400 RXTE observations of the recurrent BHC 4U 1630^17. We compare the X-ray properties for the recent 2002-2004 outburst to those of an earlier (1998) outburst, during which radio jets were observed. The results suggest a connection between hysteresis of states and major jet ejections, and it is possible that both of these are related to the evolution of the inner radius of the optically thick accretion disk.

Author

Black Holes (Astronomy); Accretion Disks; Radio Jets (Astronomy); Luminosity; Classifications; X Rays

20070003747 Stanford Univ., CA, USA, California Univ., Santa Cruz, CA, USA, Max-Planck-Inst. fuer Extraterrestrische Physik, Garching, Germany

Inverse Compton Emission from Galactic Supernova Remnants: Effect of the Interstellar Radiation Field

Porter, T. A.; Moskalenko, I. V.; Strong, A. W.; Jul. 2006; 8 pp.; In English

Report No.(s): DE2006-888781; No Copyright; Avail.: National Technical Information Service (NTIS)

The evidence for particle acceleration in supernova shells comes from electrons whose synchrotron emission is observed in radio and X-rays. Recent observations by the HESS instrument reveal that supernova remnants also emit TeV (gamma)-rays; long awaited experimental evidence that supernova remnants can accelerate cosmic rays up to the ‘knee’ energies. Still, uncertainty exists whether these (gamma)-rays are produced by electrons via inverse Compton scattering or by protons via (pi)(sup 0)-decay. The multi-wavelength spectra of supernova remnants can be fitted with both mechanisms, although a preference is often given to (pi)(sup 0)-decay due to the spectral shape at very high energies. A recent study of the interstellar radiation field indicates that its energy density, especially in the inner Galaxy, is higher than previously thought. In this paper we evaluate the effect of the interstellar radiation field on the inverse Compton emission of electrons accelerated in a supernova remnant located at different distances from the Galactic Centre. We show that contribution of optical and infra-red photons to the inverse Compton emission may exceed the contribution of cosmic microwave background and in some cases broaden the resulted (gamma)-ray spectrum.

NTIS

Compton Effect; Interstellar Radiation; Radiation Distribution; Radiation Effects; Supernovae

20070003748 Stanford Univ., CA, USA, California Univ., Santa Cruz, CA, USA, Max-Planck-Inst. fuer Extraterrestrische Physik, Garching, Germany

Inverse Compton Scattering on Solar Photons, Heliospheric Modulation, and Neutrino Astrophysics

Moskalenko, I. V.; Porter, T. A.; Digel, S. W.; Jul. 2006; 8 pp.; In English

Report No.(s): DE2006-888780; SLAC-PUB-12006; No Copyright; Avail.: National Technical Information Service (NTIS)

We study the inverse Compton scattering of solar photons by Galactic cosmic-ray electrons. We show that the (gamma)-ray emission from this process is significant with the maximum flux in the direction of the Sun; the angular distribution of the emission is broad. This previously neglected foreground should be taken into account in studies of the diffuse Galactic and extragalactic (gamma)-ray emission. Furthermore, observations by GLAST can be used to monitor the heliosphere and determine the electron spectrum as a function of position from distances as large as Saturn's orbit down to close proximity of the Sun, thus enabling studies of solar modulation in the most extreme case. This paves the way for the determination of other Galactic cosmic-ray species, primarily protons, near the solar surface leading to accurate predictions of (gamma)-rays from pp-interactions in the solar atmosphere. These albedo (gamma)-rays will be observable by GLAST, allowing the study of deep atmospheric layers, magnetic field(s), and cosmic-ray cascade development. The latter is necessary to calculate the neutrino flux from pp-interactions at higher energies (\g1 TeV). The corresponding neutrino flux from the Sun can be used as a 'standard candle' for upcoming km(sup 3) neutrino detectors, such as IceCube. Since the solar core is opaque for very high-energy neutrinos, it may be possible to directly study the mass distribution of the Sun.
NTIS
Astrophysics; Compton Effect; Electron Scattering; Heliosphere; Inverse Scattering; Modulation; Neutrinos; Photons

20070003775 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
First Results from IceCube
Klein, S. R.; January 2006; 12 pp.; In English
Report No.(s): DE2006-887446; No Copyright; Avail.: National Technical Information Service (NTIS)

IceCube is a 1 km3 neutrino observatory being built to study neutrino production in active galactic nuclei, gamma-ray bursts, supernova remnants, and a host of other astrophysical sources. High-energy neutrinos may signal the sources of ultra-high energy cosmic rays. IceCube will also study many particle-physics topics: searches for WIMP annihilation in the Earth or the Sun, and for signatures of supersymmetry in neutrino interactions, studies of neutrino properties, including searches for extra dimensions, and searches for exotica such as magnetic monopoles or Q-balls. IceCube will also study the cosmic-ray composition. In January, 2005, 60 digital optical modules (DOMs) were deployed in the South Polar ice at depths ranging from 1450 to 2450 meters, and 8 ice-tanks, each containing 2 DOMs were deployed as part of a surface air-shower array. All 76 DOMs are collecting high-quality data. After discussing the IceCube physics program and hardware, I will present some initial results with the first DOMs.
NTIS
Cosmic Rays; Neutrinos; Particle Production

20070003801 Brookhaven National Lab., Upton, NY USA
Nuclear Reaction and Structure Databases of the National Nuclear Data Center
Pritychenko, B.; Herman, M. W.; Mughabghab, S. F.; Oblozinsky, P.; Jun. 2006; 12 pp.; In English
Report No.(s): DE2006-888473; BNL-76738; No Copyright; Avail.: National Technical Information Service (NTIS)

We discuss nuclear data resources of the National Nuclear Data Center (NNDC) of relevance to nuclear astrophysics applications. These resources include databases, tools and powerful web service at www.nndc.bnl.gov. Our objective is to provide an overview of nuclear databases, related products and demonstrate nuclear astrophysics potential of the ENDF/B-VII beta2 library. A detailed discussion on the Maxwellian neutron capture cross sections obtained from the ENDF/B-VII beta2 library is presented.
NTIS
Astrophysics; Data Bases; Nuclear Reactions; Universe

20070004677 Oak Ridge National Lab., TN USA
Proceedings of the Oak Ridge Electron Linear Accelerator (ORELA) Workshop
Dunn, M. E.; Feb. 2005; 274 pp.; In English
Report No.(s): DE2006-886000; No Copyright; Avail.: National Technical Information Service (NTIS)

The Oak Ridge National Laboratory (ORNL) organized a workshop at ORNL July 14-15, 2005, to highlight the unique measurement capabilities of the Oak Ridge Electron Linear Accelerator (ORELA) facility and to emphasize the important role of ORELA for performing differential cross-section measurements in the low-energy resonance region that is important for nuclear applications such as nuclear criticality safety, nuclear reactor and fuel cycle analysis, stockpile stewardship, weapons research, medical diagnosis, and nuclear astrophysics. The ORELA workshop (hereafter referred to as the Workshop) provided the opportunity to exchange ideas and information pertaining to nuclear cross-section measurements and their importance for

nuclear applications from a variety of perspectives throughout the U.S. Department of Energy (DOE). Approximately 50 people, representing DOE, universities, and seven U.S. national laboratories, attended the Workshop. The objective of the Workshop was to emphasize the technical community endorsement for ORELA in meeting nuclear data challenges in the years to come. The Workshop further emphasized the need for a better understanding of the gaps in basic differential nuclear measurements and identified the efforts needed to return ORELA to a reliable functional measurement facility.
NTIS
Conferences; Electron Accelerators; Linear Accelerators; Particle Accelerators

20070004698 Stanford Linear Accelerator Center, CA, USA
X-Ray Spectral Study of the Photoionized Stellar Wind in Vela X-1
Watanabe, S.; Sako, M.; Ishida, M.; Ishisaki, Y.; Kahn, S. M.; Jul. 03, 2006; 26 pp.; In English
Report No.(s): DE2006-886790; SLAC-PUB-11917; No Copyright; Avail.: National Technical Information Service (NTIS)

We present results from quantitative modeling and spectral analysis of the high mass X-ray binary system Vela X-1 obtained with the Chandra High Energy Transmission Grating Spectrometer. The observations cover three orbital phase ranges within a single binary orbit. The spectra exhibit emission lines from H-like and He-like ions driven by photoionization, as well as fluorescent emission lines from several elements in lower charge states. The properties of these X-ray lines are measured with the highest accuracy to date. In order to interpret and make full use of the high-quality data, we have developed a simulator, which calculates the ionization and thermal structure of a stellar wind photoionized by an X-ray source, and performs Monte Carlo simulations of X-ray photons propagating through the wind. The emergent spectra are then computed as a function of the viewing angle accurately accounting for photon transport in three dimensions including dynamics.
NTIS
Photoionization; Spectra; Spectrum Analysis; Stellar Winds; X Ray Sources; X Rays

20070004701 Michigan State Univ., East Lansing, MI, USA, National Optical Astronomy Observatories, Tucson, AZ, USA, Stanford Univ., Stanford, CA USA, Oxford Univ., Oxford, UK
Luminosity Function of Faint Globular Clusters in M87
Waters, C. Z.; Zepf, S. E.; Lauer, T. R.; Baltz, E. A.; Silk, J.; Jul. 2006; 26 pp.; In English
Report No.(s): DE2006-886783; SLAC-PUB-11959; No Copyright; Avail.: Department of Energy Information Bridge

We present the luminosity function to very faint magnitudes for the globular clusters in M87, based on a 30 orbit Hubble Space Telescope (HST) WFPC2 imaging program. The very deep images and corresponding improved false source rejection allow us to probe the mass function further beyond the turnover than has been done before. We compare our luminosity function to those that have been observed in the past, and confirm the similarity of the turnover luminosity between M87 and the Milky Way. We also find with high statistical significance that the M87 luminosity function is broader than that of the Milky Way. We discuss how determining the mass function of the cluster system to low masses can constrain theoretical models of the dynamical evolution of globular cluster systems. Our mass function is consistent with the dependence of mass loss on the initial cluster mass given by classical evaporation, and somewhat inconsistent with newer proposals that have a shallower mass dependence.
NTIS
Elliptical Galaxies; Globular Clusters; Luminosity

20070004863 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation
deNolfo, G. A.; Moskalenko, I. V.; Binns, W. R.; Christian, E. R.; Cummings, A. C.; Davis, A. J.; George, J. S.; Hink, P. L.; Israel, M. H.; Leske, R. A.; Lijowski, M.; Mewaldt, R. A.; Stone, E. C.; Strong, A. W.; vonRosenvinge, T. T.; Wiedenbeck, M. E.; Yanasak, N. E.; [2007]; 9 pp.; In English; To appear in Journal of Advances in Space Research
Contract(s)/Grant(s): NAG5-6912; Copyright; Avail.: CASI: A02, Hardcopy

The abundance of Li, Be, and B isotopes in galactic cosmic rays (GCR) between E=50-200 MeV/nucleon has been observed by the Cosmic Ray Isotope Spectrometer (CRIS) on NASA's ACE mission since 1997 with high statistical accuracy. Precise observations of Li, Be, B can be used to constrain GCR propagation models. We find that a diffusive reacceleration model with parameters that best match CRIS results (e.g. B/C, Li/C, etc) are also consistent with other GCR observations. A approx. 15-20% overproduction of Li and Be in the model predictions is attributed to uncertainties in the production

cross-section data. The latter becomes a significant limitation to the study of rare GCR species that are generated predominantly via spallation.
Author
Lithium Isotopes; Beryllium Isotopes; Boron Isotopes; Propagation; Galactic Cosmic Rays

20070004911 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Direct Imaging of Stellar Surfaces: Results from the Stellar Imager (SI) Vision Mission Study
Carpenter, Kenneth; Schrijver, Carolus; Karovska, Margarita; [2006]; 1 pp.; In English; Cool Stars Workshop (poster presentation), 5-12 Nov. 2006, Pasadena, CA, USA; No Copyright; Avail.: Other Sources; Abstract Only

The Stellar Imager (SI) is a UV-Optical, Space-Based Interferometer designed to enable 0.1 milli-arcsecond (mas) spectral imaging of stellar surfaces and stellar interiors (via asteroseismology) and of the Universe in general. SI is identified as a ‘Flagship and Landmark Discovery Mission’’ in the 2005 Sun Solar System Connection (SSSC) Roadmap and as a candidate for a ‘Pathways to Life Observatory’’ in the Exploration of the Universe Division (EUD) Roadmap (May, 2005). The ultra-sharp images of the Stellar Imager will revolutionize our view of many dynamic astrophysical processes: The 0.1 mas resolution of this deep-space telescope will transform point sources into extended sources, and snapshots into evolving views. SI’s science focuses on the role of magnetism in the Universe, particularly on magnetic activity on the surfaces of stars like the Sun. SI’s prime goal is to enable long-term forecasting of solar activity and the space weather that it drives in support of the Living With a Star program in the Exploration Era. SI will also revolutionize our understanding of the formation of planetary systems, of the habitability and climatology of distant planets, and of many magneto-hydrodynamically controlled processes in the Universe. In this paper we will discuss the results of the SI Vision Mission Study, elaborating on the science goals of the SI Mission and a mission architecture that could meet those goals.
Author
Imaging Techniques; Interferometers; Stellar Interiors; Astrophysics; Optical Measuring Instruments; Solar Activity

20070005025 NASA Goddard Space Flight Center, Greenbelt, MD, USA
The ROSSI X-Ray Timing Explorer: Capabilities, Achievements and Aims
Swank, J. H.; [2007]; 8 pp.; In English; No Copyright; ONLINE: http://hdl.handle.net/2060/20070005025; Avail.: CASI: A02, Hardcopy

The prime scientific objectives of the Rossi X-Ray Timing Explorer (RXTE) were the study of astrophysical compact objects: black holes (galactic and extragalactic), many types of neutron stars, and accreting white dwarfs. RXTE was successful in achieving its original observing objectives of large area and high time resolution observations with broadband (2-200 keV) spectra, scheduled flexibly enough to enable observations of targets of opportunity on any timescale greater than a few hours. These capabilities enabled qualitatively new discoveries about dynamical timescale phenomena related to neutron stars and black holes, phenomena which probe basic physics in the most extreme environments of gravity, density, and magnetic fields. RXTE has extended its lifetime by applying the proportional counter area selectively and maintains schedule flexibility by making use of the distribution of targets around the sky. Proposed future observations emphasize opportunity to discover and study additional millisecond pulsars, pursue the high frequency quasi-periodic oscillations in black hole transients, and connect high frequency phenomena with longer term characteristics. RXTE will continue to strongly support, for both galactic and extragalactic targets, combining RXTE observations with other wavelengths (from IR to TeV) or with other capabilities, such as high spectral resolution.
Author
Black Holes (Astronomy); Neutron Stars; White Dwarf Stars; High Resolution; X Ray Timing Explorer; Gravitational Fields; Dynamic Characteristics

20070005035 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Trains of Magnetic Holes and Magnetic Humps in the Heliosheath
Burlaga, Leonard; Acuna, Mario; Ness, Norm; August 23, 2006; 1 pp.; In English; Heliospheric Workshop and Voyager/ACE SSG Meetings, 5-10 Nov. 2006, Oxnard, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

This paper discusses the existence of trains (sequences) of magnetic holes and magnetic humps in the heliosheath, based on Voyager 1 observations made in the intervals DOY 312.9707 - 317.0879, 2005 and DOY 185.2762 - 186.7957, 2005. These two trains represent a class of compressive fluctuations in the heliosheath. Varying from one region or time interval to another, this class of fluctuations probably depends on the varying conditions upstream the Termination Shock and its nature. The trains

of magnetic holes in the heliosheath resemble certain magnetic field strength fluctuations observed in planetary magnetosheaths.
Author
Heliosphere; Voyager 1 Spacecraft; Sequencing; Magnetic Flux

20070005102 Stanford Linear Accelerator Center, CA, USA
Exact Attractive Non-BPS STU Black Holes
Kallosh, R.; Sivanandam, N.; Soroush, M.; Jun. 27, 2006; 28 pp.; In English
Report No.(s): DE2006-887072; SLAC-PUB-11926; No Copyright; Avail.: Department of Energy Information Bridge

We develop some properties of the non-BPS attractive STU black hole. Our principle result is the construction of exact solutions for the moduli, the metric and the vectors in terms of appropriate harmonic functions. In addition, we find a spherically-symmetric attractor carrying p(sup 0) (D6 brane) and q(sub a) (D2 brane) charges by solving the non-BPS attractor equation (which we present in a particularly compact form) and by minimizing an effective black hole potential. Finally, we make an argument for the existence of multicenter attractors and conjecture that if such solutions exist they may provide a resolution to the existence of apparently unstable non-BPS 'attractors'.
NTIS
Black Holes (Astronomy); Vectors (Mathematics); Attractors (Mathematics)

20070005461 Cornell Univ., Ithaca, NY USA
Telescopic Imaging of Heater-Induced Airglow at HAARP
Kelley, Michael C; Jan 2007; 6 pp.; In English
Contract(s)/Grant(s): N00014-03-1-0978
Report No.(s): AD-A460185; CU-44467; No Copyright; Avail.: CASI: A02, Hardcopy

HF-induced fine-scale electron density variations and/or enhanced airglow in the ionosphere were investigated. These irregularities appear to trap waves and cause them to 'self-focus.' Knowing what irregularities exist is important for improving communications and for pure discovery research on wave-particle interactions in the lower ionosphere at high latitudes. To develop accurate models of its behavior, lower ionospheric structure must be known. Under this grant, we conducted telescopic imaging of heater-induced airglow at HAARP to optically measure fine structure in the ionosphere and to study airglow sources. In the presence of aurora and a strong blanketing E layer, HAARP was modulated at intervals of several seconds. For several cycles, small bright airglow spots were observed whenever HAARP was on. These spots are elongated horizontally, indicating drift motion, and are the same order of brightness as the aurora. Such bright artificial airglow was never recorded previously. These results were published in the journal Nature.
DTIC
Airglow; Auroras; Heaters; Images; Imaging Techniques; Telescopes

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*.

20070003683 NASA Marshall Space Flight Center, Huntsville, AL, USA
Origin and Evolution of Deep Plasmaspheric Notches
Gallagher, D. L.; Adrian, M. L.; Liemohn, M. W.; Journal of Geophysical Research; Sep. 1, 2005; ISSN 0148-0227; Volume 100; 11 pp.; In English; Original contains color and black and white illustrations
Report No.(s): Paper-2004JA010906; Copyright; Avail.: Other Sources

Deep plasmaspheric notches can extend over more than 2 R(sub E) in radial distance and 3 hours MLT in the magnetic equatorial plane, as observed by the extreme ultraviolet (EUV) imager on the IMAGE mission. They are among the largest evacuated features in the exterior plasmaspheric boundary. They can last for days and exhibit a variety of shapes. It appears that weak convection and limited erosion precedes notch formation at the westward, near-Earth edge of the convection plume. Eighteen clear notch events were found and analyzed in 2000. Among these events, notches were found to drift as slowly as 44% of corotation. In only one case was a notch found to drift at the corotation rate within measurement error. On average, these notches drift at about 21.5 h d(sup -1) or 90% of the corotational rate. Notches sometimes exhibit an interior structure that appears as an extended prominence of dense plasma, which forms a W- or M-like feature in IMAGE/EUV images, depending on viewing perspective. Initial modeling suggests that notches and notch prominences may be caused in part by intense small-scale potential structures that result from the localized injection of ring current plasma. Plasma filling rates during recovery are examined in three L shell ranges from L = 2 to L = 3.5 with rates ranging from 5 to 140 cm(sup -3) d(sup -1). Plasma loss during a minor substorm is found to extend to surprisingly low L shell with rates ranging from 100 to 130 cm(sup -3) d(sup -1) across the L shells examined.

Author

Notches; Plasmasphere; Space Missions; Planetary Evolution; Earth Sciences

20070003687 NASA Johnson Space Center, Houston, TX, USA

Exploration Life Support Technology Development Challenges

Chambliss Joe; Rulis, Susan; [2007]; 1 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA

Contract(s)/Grant(s): WBS 572-01-04; Copyright; Avail.: Other Sources; Abstract Only

The Exploration Life Support project is developing technologies to address the needs for life support during NASA s exploration missions. The focus of development is Air Revitalization, Water Recovery, and Waste Management Systems (ARS, WRS, and WMS). The approach to meeting exploration needs for life support intrinsically involves processing mixtures of gases, liquids and solids; thus the effects of micro or hypo gravity must be considered in developing and verifying the technologies. This paper provides an overview of the ELS project, how ELS technologies are planned to be used in exploration vehicles and the challenges being addressed.

Author

Life Support Systems; Technology Utilization; Space Exploration; NASA Space Programs; Space Missions

20070003720 NASA Johnson Space Center, Houston, TX, USA

Ar-39-Ar-40 Ages of Two Nakhlites, MIL03346 and Y000593: A Detailed Analysis

Park, Jisun; Garrison, Daniel; Bogard, Donald; [2007]; 2 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar. 2007, Houston, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Radiometric dating of martian nakhlites by several techniques have given similar ages of approx.1.2-1.4 Ga [e.g. 1, 2]. Unlike the case with shergottites, where the presence of martian atmosphere and inherited radiogenic Ar-40 produce apparent Ar-39-Ar-40 ages older than other radiometric ages, Ar-Ar ages of nakhlites are similar to ages derived by other techniques. However, even in some nakhlites the presence of trapped martian Ar produces some uncertainty in the Ar-Ar age. We present here an analysis of such Ar-Ar ages from the MIL03346 and Y000593 nakhlites.

Derived from text

Argon Isotopes; Chronology; Nakhlites; Radiometers; Mars (Planet); Radiogenic Materials

20070003723 NASA Johnson Space Center, Houston, TX, USA

Rb-Sr and Sm-Nd Isotopic Studies of Martian Depleted Shergottes SaU 094/005

Shih, C.-Y.; Nyquist, L. E.; Reese, Y.; [2007]; 2 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar. 2007, Houston, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Sayh al Uhaymir (SaU) 094 and SaU 005 are olivine-phyric shergottites from the Oman desert and are considered as pairs. [e.g., 1]. They are very similar to the Libyan desert shergottite Dar al Gani (DaG) 476 in petrology, chemistry and ejection age [2-6]. This group of shergottites, also recognized as depleted shergottites [e.g. 7] has been strongly shocked and contains very low abundances of light rare earth elements (REE). In addition, terrestrial contaminants are commonly present in meteorites found in desert environments. Age-dating these samples is very challenging, but lower calcite contents in the SaU meteorites suggest that they have been subjected to less severe desert weathering than their DaG counterparts [3-4]. In this report, we present Rb-Sr and Sm-Nd isotopic results for SaU 094 and SaU 005, discuss the correlation of their ages with those of other similar shergottites, and discuss their petrogenesis.

Author

Shergottites; Rubidium Isotopes; Strontium Isotopes; Samarium Isotopes; Neodymium Isotopes; Mars (Planet); Depletion

20070003732 NASA Johnson Space Center, Houston, TX, USA

Active Thermal Control System Development for Exploration

Westheimer, David; [2007]; 22 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 103-04-01-01-10; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003732; Avail.: CASI: A03, Hardcopy

All space vehicles or habitats require thermal management to maintain a safe and operational environment for both crew and hardware. Active Thermal Control Systems (ATCS) perform the functions of acquiring heat from both crew and hardware within a vehicle, transporting that heat throughout the vehicle, and finally rejecting that energy into space. Almost all of the energy used in a space vehicle eventually turns into heat, which must be rejected in order to maintain an energy balance and temperature control of the vehicle. For crewed vehicles, Active Thermal Control Systems are pumped fluid loops that are made up of components designed to perform these functions. NASA has been actively developing technologies that will enable future missions or will provide significant improvements over the state of the art technologies. These technologies have are targeted for application on the Crew Exploration Vehicle (CEV), or Orion, and a Lunar Surface Access Module (LSAM). The technologies that have been selected and are currently under development include: fluids that enable single loop ATCS architectures, a gravity insensitive vapor compression cycle heat pump, a sublimator with reduced sensitivity to feedwater contamination, an evaporative heat sink that can operate in multiple ambient pressure environments, a compact spray evaporator, and lightweight radiators that take advantage of carbon composites and advanced optical coatings.

Author

Active Control; Temperature Control; Control Systems Design; Space Exploration

20070003733 NASA Johnson Space Center, Houston, TX, USA

A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition

Perronnet, M.; Zolensky, M. E.; Gounelle, M.; Schwandt, C. S.; [2007]; 38 pp.; In English; Meteoritics and Planetary Science, projected release date Jan. 1, 2007; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

CR carbonaceous chondrites are of the major interest since they contain one of the most primitive organic matters. However, aqueous alteration has more or less overprinted their original features in a way that needed to be assessed. That was done in the present study by comparing the mineralogy of the most altered CR1 chondrite, GRO 95577, to a less altered CR2, Renazzo. Their modal analyses were achieved thanks to a new method, based on X-ray elemental maps acquired on electron microprobe, and on IDL image treatment. It allowed the collection of new data on the composition of Renazzo and confirmed the classification of GRO 95577 as a CR1. New alteration products for CRs, vermiculite and clinochlore, were observed. The homogeneity of the Fe-poor clays in the CR1 and the distinctive matrix composition in the two chondrites suggest a wide-range of aqueous alteration on CRs. The preservation of the outlines of the chondrules in GRO 95577 and the elemental transfers of Al, Fe and Ca throughout the chondrule and of Fe and S from the matrix to the chondrule favor the idea of an asteroidal location of the aqueous alteration. From their mineralogical descriptions and modal abundances, the element repartitions in Renazzo and GRO 95577 were computed. It indicates a possible relationship between these two chondrites via an isochemical alteration process. Knowing the chemical reactions that occurred during the alteration, it was thus possible to decipher the mineralogical modal abundances in the unaltered CR body.

Author

Carbonaceous Chondrites; Meteoritic Composition; Mineralogy; Organic Materials

20070003734 NASA Johnson Space Center, Houston, TX, USA

In-situ micro-FTIR Study of Thermal Changes of Organics in Tagish Lake Meteorite: Behavior of Aliphatic Oxygenated Functions and Effects of Minerals

Kebukawa, Yoko; Nakashima, Satoru; Nakamura-Messenger, Keiko; Zolensky, Michael E.; [2007]; 28 pp.; In English; Copyright; Avail.: CASI: A03, Hardcopy

Systematic in-situ FTIR heating experiments of Tagish Lake meteorite grains have been performed in order to study thermal stability of chondritic organics. Some aliphatic model organic substances have also been used to elucidate effects of hydrous phyllosilicate minerals on the thermal stability of organics. The experimental results indicated that organic matter in the Tagish Lake meteorite might contain oxygenated aliphatic hydrocarbons which are thermally stable carbonyls such as ester and/or C=O in ring compounds. The presence of hydrous phyllosilicate minerals has a pronounced effect on the increase of the thermal stability of aliphatic and oxygenated functions. These oxygenated aliphatic organics in Tagish Lake can be formed during the aqueous alteration in the parent body and the formation temperature condition might be less than 200 C, based especially on the thermal stability of C-O components. The hydrous phyllosilicates might provide sites for organic globule formation and protected some organic decomposition

Author

Aliphatic Hydrocarbons; Meteorites; Minerals; Organic Materials; Oxygenation; In Situ Measurement; Fourier Transformation; Infrared Spectroscopy

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20070003741 NASA Johnson Space Center, Houston, TX, USA

Genesis Silicon Carbide Concentrator Target 60003 Preliminary Ellipsometry Mapping Results

Calaway, M. J.; Rodriquez, M. C.; Stansbery, E. K.; [2007; 2 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar. 2007, Houston, TX, USA; Original contains color illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003741; Avail.: CASI: A01, Hardcopy

The Genesis concentrator was custom designed to focus solar wind ions primarily for terrestrial isotopic analysis of O-17/O-16 and O-18/O-16 to +/-1%, N-15/N-14 to +/-1%, and secondarily to conduct elemental and isotopic analysis of Li, Be, and B. The circular 6.2 cm diameter concentrator target holder was comprised of four quadrants of highly pure semiconductor materials that included one amorphous diamond-like carbon, one C-13 diamond, and two silicon carbide (SiC). The amorphous diamond-like carbon quadrant was fractured upon impact at Utah Test and Training Range (UTTR), but the remaining three quadrants survived fully intact and all four quadrants hold an important collection of solar wind. The quadrants were removed from the target holder at NASA Johnson Space Center Genesis Curation Laboratory in April 2005, and have been housed in stainless steel containers under continual nitrogen purge since time of disintegration. In preparation for allocation of a silicon carbide target for oxygen isotope analyses at UCLA, the two SiC targets were photographed for preliminary inspection of macro particle contamination from the hard non-nominal landing as well as characterized by spectroscopic ellipsometry to evaluate thin film contamination. This report is focused on Genesis SiC target sample number 60003.

Author

Chemical Analysis; Concentrators; Ellipsometry; Oxygen Isotopes; Solar Wind; Sample Return Missions

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20070003746 NASA Johnson Space Center, Houston, TX, USA

Decontamination of Genesis Array Materials by UV Ozone Cleaning

Calaway, Michael J.; Burnett, D. S.; Rodriquez, M. C.; Sestak, S.; Allton, J. H.; Stansbery, E. K.; [2007]; 2 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar. 2007, Houston, TX, USA; Copyright; Avail.: CASI: A01, Hardcopy

Shortly after the NASA Genesis Mission sample return capsule returned to earth on September 8, 2004, the science team discovered that all nine ultra-pure semiconductor materials were contaminated with a thin molecular organic film approximately 0 to 100 angstroms thick. The organic contaminate layer, possibly a silicone, situated on the surface of the materials is speculated to have formed by condensation of organic matter from spacecraft off-gassing at the Lagrange 1 halo orbit during times of solar exposure. While the valuable solar wind atoms are safely secured directly below this organic contamination and/or native oxide layer in approximately the first 1000 angstroms of the ultra-pure material substrate, some analytical techniques that precisely measure solar wind elemental abundances require the removal of this organic contaminate. In 2005, Genesis science team laboratories began to develop various methods for removing the organic thin film without removing the precious material substrate that contained the solar wind atoms. Stephen Sestak and colleagues at Open University first experimented with ultraviolet radiation ozone (UV/O3) cleaning of several non-flight and flown Genesis silicon wafer fragments under a pure flowing oxygen environment. The UV/O3 technique was able to successfully remove organic contamination without etching into the bulk material substrate. At NASA Johnson Space Center Genesis Curation Laboratory, we have installed an UV/O3 cleaning devise in an ambient air environment to further experimentally test the removal of the organic contamination on Genesis wafer materials. Preliminary results from XPS analysis show that the UV/O3 cleaning instrument is a good non-destructive method for removing carbon contamination from flown Genesis array samples. However, spectroscopic ellipsometry results show little change in the thickness of the surface film. All experiments to date have shown UV/O3 cleaning method to be the best non-destructive method for removing organic contamination from the surface of the Genesis materials. The UV/O3 cleaning process can also clean carbon contamination to levels below non-flight standards. This can be seen by comparing sample 60260's carbon 10667 cps with non-flight Si carbon 21675 cps. Therefore, surface carbon contamination should not hinder the analysis of solar wind.

Derived from text

Cleaning; Decontamination; Ozone; Sample Return Missions; Surface Properties

20070003751 NASA Johnson Space Center, Houston, TX, USA

Sm-Nd Isotopic Systematics of Troctolite 76335

Edmunson, J.; Nyquist, L. E.; Borg, L. E.; [2007]; 2 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar. 2007, Houston, TX, USA; Copyright; Avail.: CASI: A01, Hardcopy

A study of the Sm-Nd isotopic systematics of lunar Mg-suite troctolite 76335 was undertaken to further establish the early chronology of lunar magmatism. Because the Rb-Sr isotopic systematics of similar sample 76535 yielded an age of 4570 +/- 70 Ma [2, lambda = 1.402 x 10(exp -11)], 76335 was expected to yield an old age. In contrast, the Sm-Nd and K-Ar ages of 76535 indicate that the sample is approximately 4260 Ma old, one of the youngest ages obtained for a Mg-suite rock. This study establishes the age of 76335 and discusses the constraints placed on its petrogenesis by its Sm-Nd isotope systematics. The Sm-Nd isotopic system of lunar Mg-suite troctolite 76335 indicates an age of 4278 +/- 60 Ma with an initial epsilon (sup 143)(sub Nd) value of 0.06 +/- 0.39. These values are consistent with the Sm-Nd isotopic systematics of similar sample 76535. Thus, it appears that a robust Sm-Nd age can be determined from a highly brecciated lunar sample. The Sm-Nd isotopic systematics of troctolites 76335 and 76535 appear to be different from those dominating the Mg-suite norites and KREEP basalts. Further analysis of the Mg-suite must be completed to reveal the isotopic relationships of these early lunar rocks.

Derived from text

KREEP; Samarium Isotopes; Neodymium Isotopes; Magnesium; Chronology

20070003756 NASA Johnson Space Center, Houston, TX, USA, NASA Kennedy Space Center, Cocoa Beach, FL, USA

STS-114 Micrometeoroid/Orbital Debris (MMOD) Post-Flight Assessment

Hyde, J.; Bernhard, R.; Christiansen, E.; Orbital Debris Quarterly News; [2007], pp. 2-3; In English; Original contains color illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20070003756; Avail.: CASI: A01, Hardcopy

NASA Johnson Space Center (JSC) personnel assisted Kennedy Space Center (KSC) inspection teams in the identification of 41 micrometeoroid/orbital debris (MMOD) impact sites on the OV-103 vehicle (Discovery) during STS-114 postflight inspections. There were 14 MMOD impacts reported on the crew module windows (Figure 1). The largest impact feature, a 6.6 mm x 5.8 mm crater on window #4, was caused by a particle with an estimated diameter of 0.22 mm (Figure 2). This impact was among the largest ever recorded on a crew module window. The window was removed and replaced. Scanning Electron Microscope/Energy Dispersive X-ray (SEM/EDX) analysis of dental mold samples from the impact site to determine particle origin was inconclusive, possibly due to contamination picked up on the ferry flight from Edwards Air Force Base to KSC. The radiators on the inside of the payload bay doors sustained 19 impacts (Figure 3) with one of the impacts causing a face sheet perforation. The 0.61 mm diameter hole was produced by a particle with an estimated diameter of 0.4 mm, which approaches the 0.5-mm critical particle diameter of the wing leading edge reinforced carbon-carbon (RCC) panel high-temperature regions (Zone 3, Figure 4) that was established during Return to Flight testing of the RCC panels. An inspection of the payload bay door exterior insulation (FRSI) revealed a 5.8 mm x 4.5 mm defect that was caused by an MMOD particle with unknown composition, as the sample obtained was contaminated. Figure 5 provides a summary of the exterior surface survey that was conducted following the STS-114 mission. Two windows were removed and replaced due to hypervelocity impact. Nineteen impacts were recorded on the payload bay door radiators, with one face sheet penetration. Three impact sites were identified on the FRSI. There were four hypervelocity impact sites detected on the wing leading edge RCC panels. One impact was detected on the top cover of the TPS sample box (TSB) payload that was mounted on a carrier in the aft portion of the payload bay.

Author

Micrometeoroids; Space Debris; Postflight Analysis; Discovery (Orbiter); Space Shuttle Missions; Hypervelocity Impact

20070003758 NASA Johnson Space Center, Houston, TX, USA

The Origin of Dark Inclusions in Allende: New Evidence from Lithium Isotopes

Sephton, Mark A.; James, Rachael H.; Zolensky, Michael E.; Meteoritics and Planetary Science; [2006]; Volume 41, No. 7; 5 pp.; In English

Report No.(s): IARC-Contrib-2005-0932; Copyright; Avail.: CASI: A01, Hardcopy

Aqueous and thermal processing of primordial material occurred prior to and during planet formation in the early solar system. A record of how solid materials were altered at this time is present in the carbonaceous chondrites, which are naturally delivered fragments of primitive asteroids. It has been proposed that some materials, such as the clasts termed dark inclusions found in type III chondrites, suggest a sequence of aqueous and thermal events. Lithium isotopes (Li-6 and Li-7) can reveal the role of liquid water in dark inclusion history. During aqueous alteration, Li-7 passes preferentially into solution leaving Li-6 behind in the solid phase and, consequently, any relatively extended periods of interaction with Li-7-rich fluids would have left the dark inclusions enriched in the heavier isotope when compared to the meteorite as a whole. Our analyses of lithium isotopes in Allende and its dark inclusions reveal marked isotopic homogeneity and no evidence of greater levels of aqueous alteration in dark inclusion history.

Author

Inclusions; Lithium Isotopes; Allende Meteorite; Planetary Evolution; Sedimentary Rocks

20070003760 NASA Johnson Space Center, Houston, TX, USA

Sm-Nd and Rb-Sr Ages for MIL 05035: Implications for Surface and Mantle Sources

Nyquist, L. E.; Shih, C-Y.; Reese, Y. D.; [2007]; 2 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar. 2007, Houston, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The Sm-Nd and Rb-Sr ages and also the initial Nd and Sr isotopic compositions of MIL 05035 are the same as those of A-881757. Comparing the radiometric ages of these meteorites to lunar surface ages as modeled from crater size-frequency distributions as well as the TiO2 abundances and initial Sr-isotopic compositions of other basalts places their likely place of origin as within the Australe or Humboldtianum basins. If so, a fundamental west-east lunar asymmetry in compositional and isotopic parameters that likely is due to the PKT is implied.

Author

Samarium; Neodymium; Rubidium; Strontium; Geochronology; Lunar Surface; Meteorites

20070004583 NASA Johnson Space Center, Houston, TX, USA

Digital Learning Network Education Events of NASA's Extreme Environments Mission Operations

Paul, Heather; Guillory, Erika; [2007]; 1 pp.; In English; International Conference on Environmental Systems, 9-12 Jul. 2007, Chicago, IL

Contract(s)/Grant(s): WBS 371-04-01-05-01; Copyright; Avail.: Other Sources; Abstract Only

NASA's Digital Learning Network (DLN) reaches out to thousands of students each year through video conferencing and web casting. The DLN has created a series of live education videoconferences connecting NASA s Extreme Environment Missions Operations (NEEMO) team to students across the USA. The programs are also extended to students around the world live web casting. The primary focus of the events is the vision for space exploration. During the programs, NEEMO Crewmembers including NASA astronauts, engineers and scientists inform and inspire students about the importance of exploration and share the impact of the project as it correlates with plans to return to the moon and explore the planet Mars. These events highlight interactivity. Students talk live with the aquanauts in Aquarius, the National Oceanic and Atmospheric Administration s underwater laboratory. With this program, NASA continues the Agency s tradition of investing in the nation's education programs. It is directly tied to the Agency's major education goal of attracting and retaining students in science, technology, and engineering disciplines. Before connecting with the aquanauts, the students conduct experiments of their own designed to coincide with mission objectives. This paper describes the events that took place in September 2006.

Author

Education; NASA Programs; Pulse Communication; Machine Learning; Space Missions

20070004584 NASA Johnson Space Center, Houston, TX, USA

Powered Descent Trajectory Guidance and Some Considerations for Human Lunar Landing

Sustaric, Ronald R.; [2007]; 17 pp.; In English; 2007 AAS Guidance and Control Conference, 3-7 Feb. 2007, Breckenridge, CO, USA; Original contains color illustrations

Contract(s)/Grant(s): 152-04-05-01-10

Report No.(s): AAS-07-051; No Copyright; ONLINE: http://hdl.handle.net/2060/20070004584; Avail.: CASI: A03, Hardcopy

The Autonomous Precision Landing and Hazard Detection and Avoidance Technology development (ALHAT) will enable an accurate (better than 100m) landing on the lunar surface. This technology will also permit autonomous (independent from ground) avoidance of hazards detected in real time. A preliminary trajectory guidance algorithm capable of supporting these tasks has been developed and demonstrated in simulations. Early results suggest that with expected improvements in sensor technology and lunar mapping, mission objectives are achievable.

Author

Autonomy; Descent Trajectories; Hazards; Lunar Landing; Trajectory Control; Manned Space Flight; Thrust

20070004933 NASA Johnson Space Center, Houston, TX, USA

Layered Sediments, Rampart Craters, and Potential Fluvio-Lacustrine Activity in S.W. Arabia Terra, Mars: Support for a History of Aqueous Conditions

Oehler, D. Z.; Allen, C. C.; Venechuk, E. M.; Paris, K. N.; [2007]; 2 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar. 2007, Houston, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Arabia Terra is a unique area on Mars in that it is the only major, equatorial region characterized by high abundances of near-surface water (as measured by gamma ray and neutron spectroscopy). Vernal Crater is a 55 km-diameter structure in southwest Arabia Terra, centered at 6 N, 355.5 E. The crater includes layered sediments, potential remnants of fluvio-lacustrine activity, and indications of aeolian processes. Regional considerations, along with new THEMIS and MOC data, are being assessed to gain insight into the significance of the geomorphic units within Vernal Crater and the geologic history of SW Arabia Terra.

Author

Mars Surface; Mars Craters; Extraterrestrial Water; Equatorial Regions

20070005066 Brookhaven National Lab., Upton, NY USA

CCD and PIN-CMOS Developments for Large Optical Telescope

Radeka, V.; Apr. 2006; 16 pp.; In English

Report No.(s): DE2006-889288; BNL-76772-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

Higher quantum efficiency in near-IR, narrower point spread function and higher readout speed than with conventional sensors have been receiving increased emphasis in the development of CCDs and silicon PIN-CMOS sensors for use in large optical telescopes. Some key aspects in the development of such devices are reviewed.

NTIS

Charge Coupled Devices; CMOS; Pins; Technology Assessment; Telescopes

20070005091 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Titan Ion Composition at Magnetosphere-Ionosphere Transition Region

Sittler, Edward C.; Hartle, R. E.; Shappirio, M.; Simpson, D. J.; COoper, J. F.; Burger, M. H.; Johnson, R. E.; Bertucci, C.; Luhman, J. G.; Ledvina, S. A.; Szego, K.; Coates, A. J.; Young, D. T.; September 05, 2006; 1 pp.; In English; 38th Annual Division of Planetary Sciences Meeting, 9-13 Oct. 2006, Pasadena, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

Using Cassini Plasma Spectrometer (CAPS) Ion Mass Spectrometer (IMS) ion composition data, we will investigate the compositional changes at the transition region between Saturn's magnetospheric flow and Titan's upper ionosphere. It is this region where scavenging of Titan's upper ionosphere can occur, where it is then dragged away by the magnetospheric flow as cold plasma for Saturn's magnetosphere. This cold plasma may form plumes as originally proposed by (1) during the Voyager 1 epoch. This source of cold plasma may have a unique compositional signature such as methane group ions. Water group ions that are observed in Saturn's outer magnetosphere (2,3) are relatively hot and probably come from the inner magnetosphere where they are born from fast neutrals escaping Enceladus (4) and picked up in the outer magnetosphere as hot plasma (5). This scenario will be complicated by pickup methane ions within Titan's mass loading region, as originally predicted by (6) based on Voyager 1 data and observationally confirmed by (3,7) using CAPS IMS data. But, CH4(+) ions or their fragments can only be produced as pickup ions from Titan's exosphere which can extend beyond the transition region of concern here, while CH5(+) ions can be scavenged from Titan's ionosphere. We will investigate these possibilities.

Author

Exosphere; Ions; Magnetosphere-Ionosphere Coupling; Methane; Titan Atmosphere; Planetary Composition

20070005119 Lawrence Livermore National Lab., Livermore, CA USA

Evolution of Intermediate and Low Mass Binary Systems

Eggleton, P. P.; Oct. 27, 2005; 20 pp.; In English

Report No.(s): DE2006-886668; No Copyright; Avail.: Department of Energy Information Bridge

There are a number of binaries, fairly wide and with one or even two evolved giant components, that do not agree very well with conventional stellar evolution: the secondaries are substantially larger (oversized) than they should be because their masses are quite low compared with the primaries. I discuss the possibility that these binaries are former triples, in which a merger has occurred fairly recently in a short-period binary sub-component. Some mergers are expected, and may follow a

phase of contact evolution. I suggest that in contact there is substantial transfer of luminosity between the components due to differential rotation, of the character observed by helioseismology in the Sun's surface convection zone.
NTIS
Mass; Stellar Evolution

92
SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots. For related information see *93 Space Radiation*.

20070004634 NASA Marshall Space Flight Center, Huntsville, AL, USA
Radiation and Plasma Environments for Lunar Missions
Minow, Joseph I.; Edwards, David L.; Altstatt, Richard L.; Diekmann, Anne M.; Blackwell, William C., Jr.; Harine, Katherine J.; [2006]; 38 pp.; In English; 47th International Astronautical Congress, 2-6 Oct. 2006, Valencia, Spain; Original contains black and white illustrations
Report No.(s): IAC-06-D5.2.05; Copyright; Avail.: CASI: A03, Hardcopy

Space system design for lunar orbit and extended operations on the lunar surface requires analysis of potential system vulnerabilities to plasma and radiation environments to minimize anomalies and assure that environmental failures do not occur during the mission. Individual environments include the trapped particles in Earth s radiation belts, solar energetic particles and galactic cosmic rays, plasma environments encountered in transit to the moon and on the lunar surface (solar wind, terrestrial magnetosheath and magnetotail, and lunar photoelectrons), and solar ultraviolet and extreme ultraviolet photons. These are the plasma and radiation environments which contribute to a variety of effects on space systems including total ionizing dose and dose rate effects in electronics, degradation of materials in the space environment, and charging of spacecraft and lunar dust. This paper provides a survey of the relevant charged particle and photon environments of importance to lunar mission design ranging from the lowest (approx.few 10 s eV) photoelectron energies to the highest (approx.GeV) cosmic ray energies.
Author
Aerospace Environments; Plasma Radiation; Lunar Orbits; Terrestrial Radiation; Radiation Belts; Energetic Particles; Charged Particles

20070005042 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Alfven Waves in the Solar Wind, Magnetosheath, and Outer Magnetosphere
Sibeck, D. G.; [2007]; 1 pp.; In English; 2006 Huntsville Workshop Outstanding Problems in Geospace Connections Modeling, 2-6 Oct. 2006, Huntsville, TN, USA; No Copyright; Avail.: Other Sources; Abstract Only

Alfven waves Propagating outward from the Sun are ubiquitous in the solar wind and play a major role in the solar wind-magnetosphere interaction. The passage of the waves generally occurs in the form of a series of discrete steepened discontinuities, each of which results in an abrupt change in the interplanetary magnetic field direction. Some orientations of the magnetic field permit particles energized at the Earth's bow shock to gain access to the foreshock region immediately upstream from the Earth's bow shock. The thermal pressure associated with these particles can greatly perturb solar wind plasma and magnetic field parameters shortly prior to their interaction with the Earth's bow shock and magnetosphere. The corresponding dynamic pressure variations batter the magnetosphere, driving magnetopause motion and transient compressions of the magnetospheric magnetic field. Alfven waves transmit information concerning the dynamic pressure variations applied to the magnetosphere to the ionosphere, where they generate the traveling convection vortices (TCVs) seen in high-latitude ground magnetograms. Finally, the sense of Alfvenic perturbations transmitted into the magnetosheath reverses across local noon because magnetosheath magnetic field lines drape against the magnetopause. The corresponding change in velocity perturbations must apply a weak torque to the Earth's magnetosphere.
Author
Solar Wind; Magnetohydrodynamic Waves; Magnetic Field Configurations; Magnetosheath; Plasma Waves; Shock Waves; Interplanetary Magnetic Fields; Air Water Interactions

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*.

20070004574 NASA Langley Research Center, Hampton, VA, USA

A Dynamic/Anisotropic Low Earth Orbit (LEO) Ionizing Radiation Model

Badavi, Francis F.; West, Katie J.; Nealy, John E.; Wilson, John W.; Abrahms, Briana L.; Luetke, Nathan J.; December 2006; 32 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 759-07-09

Report No.(s): NASA/TP-2006-214533; L-19312; Copyright; Avail.: CASI: A03, Hardcopy

The International Space Station (ISS) provides the proving ground for future long duration human activities in space. Ionizing radiation measurements in ISS form the ideal tool for the experimental validation of ionizing radiation environmental models, nuclear transport code algorithms, and nuclear reaction cross sections. Indeed, prior measurements on the Space Transportation System (STS; Shuttle) have provided vital information impacting both the environmental models and the nuclear transport code development by requiring dynamic models of the Low Earth Orbit (LEO) environment. Previous studies using Computer Aided Design (CAD) models of the evolving ISS configurations with Thermo Luminescent Detector (TLD) area monitors, demonstrated that computational dosimetry requires environmental models with accurate non-isotropic as well as dynamic behavior, detailed information on rack loading, and an accurate 6 degree of freedom (DOF) description of ISS trajectory and orientation.

Author

Low Earth Orbits; Dynamic Models; Extraterrestrial Radiation; Ionizing Radiation; Anisotropy; International Space Station

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20070005030 NASA Johnson Space Center, Houston, TX, USA

Evaluating Shielding Effectiveness for Reducing Space Radiation Cancer Risks

Cucinotta, Francis A.; Kim, Myung-Hee Y.; Ren, Lei; [2007]; 34 pp.; In English; Copyright; Avail.: CASI: A03, Hardcopy

We discuss calculations of probability distribution functions (PDF) representing uncertainties in projecting fatal cancer risk from galactic cosmic rays (GCR) and solar particle events (SPE). The PDF s are used in significance tests of the effectiveness of potential radiation shielding approaches. Uncertainties in risk coefficients determined from epidemiology data, dose and dose-rate reduction factors, quality factors, and physics models of radiation environments are considered in models of cancer risk PDF s. Competing mortality risks and functional correlations in radiation quality factor uncertainties are treated in the calculations. We show that the cancer risk uncertainty, defined as the ratio of the 95% confidence level (CL) to the point estimate is about 4-fold for lunar and Mars mission risk projections. For short-stay lunar missions (\h180 d), SPE s present the most significant risk, however one that is mitigated effectively by shielding, especially for carbon composites structures with high hydrogen content. In contrast, for long duration lunar (\g180 d) or Mars missions, GCR risks may exceed radiation risk limits, with 95% CL s exceeding 10% fatal risk for males and females on a Mars mission. For reducing GCR cancer risks, shielding materials are marginally effective because of the penetrating nature of GCR and secondary radiation produced in tissue by relativistic particles. At the present time, polyethylene or carbon composite shielding can not be shown to significantly reduce risk compared to aluminum shielding based on a significance test that accounts for radiobiology uncertainties in GCR risk projection.

Author

Probability Distribution Functions; Galactic Cosmic Rays; Cancer; Risk; Solar Corpuscular Radiation; Radiation Dosage; Radiation Shielding; Relativistic Particles; Epidemiology

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.

20070003552 Naval Research Lab., Washington, DC USA
The Passive Countermeasures Program at the Naval Research Laboratory
Jul 1, 1957; 23 pp.; In English
Report No.(s): AD-A459664; NRL-MR-701; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Countermeasures; Navy; Research and Development

20070003710 Navy Personnel Research Studies and Technology, Millington, TN USA
Development of a Navy Job-Specific Vocational Interest Model
Dec 2006; 99 pp.; In English
Report No.(s): AD-A459442; NPRST-TN-07-2; No Copyright; Avail.: CASI: A05, Hardcopy

No abstract available

Navy; Tasks; Models

20070003853 Air Force Research Lab., Wright-Patterson AFB, OH USA
Defense Display Strategy and Roadmaps
Aug 6, 2002; 8 pp.; In English
Report No.(s): AD-A459657; ASC-02-1985; No Copyright; Avail.: CASI: A02, Hardcopy

No abstract available

Military Technology; Civil Defense; Mapping

20070003904 Virginia Commonwealth Univ., Richmond, VA USA
Synthesis of Multifunctional Materials
Sep 2006; 23 pp.; In English
Contract(s)/Grant(s): N00014-04-1-0347
Report No.(s): AD-A459645; VCU-TR-529196; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Synthesis; Materials Science

20070004623 Army Tank-Automotive and Armaments Command, Warren, MI USA
Between Imprudent and Impossible, Survivability Implications of Threat Analysis or What Threats Should We Design Against
Apr 2002; 13 pp.; In English
Report No.(s): AD-A459810; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Threat Evaluation; Warning Systems; Situational Awareness

20070004629 Massachusetts Inst. of Tech., Cambridge, MA USA
Building from the Bottom Up
May 2003; 9 pp.; In English
Report No.(s): AD-A459808; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Buildings; Construction Materials

20070004631 Army Tank-Automotive Research and Development Command, Warren, MI USA
External View of the DARPA Grand Challenge
Apr 17, 2006; 12 pp.; In English
Report No.(s): AD-A459807; 15666; No Copyright; Avail.: CASI: A03, Hardcopy
No abstract available
Viewing; Imagery

20070004632 Naval Postgraduate School, Monterey, CA USA
U.S. Security Posture in the Middle East: Need for a Change
Dec 2002; 84 pp.; In English
Report No.(s): AD-A459802; No Copyright; Avail.: Defense Technical Information Center (DTIC)
No abstract available
Security; Middle East; Governments

20070004693 Army Test and Evaluation Command, Aberdeen Proving Ground, MD USA
Standardized UXO Technology Demonstration Site Open Field Scoring Record No. 802
Nov 2006; 56 pp.; In English
Contract(s)/Grant(s): Proj-8-CO-160-UXO-021
Report No.(s): AD-A459741; ATC-9235; No Copyright; Avail.: CASI: A04, Hardcopy
No abstract available
Scoring; Standardization

20070004769 Mitre Corp., Bedford, MA USA
Toward the Use of an Upper Ontology for U.S. Government and U.S. Military Domains: An Evaluation
Sep 2004; 43 pp.; In English
Contract(s)/Grant(s): FA9721-04-0001
Report No.(s): AD-A459575; MTR-04B0000063; No Copyright; Avail.: CASI: A03, Hardcopy
No abstract available
Evaluation; Domains; Military Operations

20070004793 Hochschule der Bundeswehr, Strausberg, Germany
Right-Wing Extremism in Germany and the Consequences for the Armed Forces (Rechtsextreme orientierungen in deutschland und ihre folgen fuer die bundeswehr)
Jun 2001; 62 pp.; In English
Report No.(s): AD-A459543; No Copyright; Avail.: CASI: A04, Hardcopy
No abstract available
Armed Forces; Germany

20070004838 Massachusetts Inst. of Tech., Cambridge, MA USA
Performance Analysis of Poll-Based Retransmission Schemes
Aug 1993; 25 pp.; In English
Report No.(s): AD-A459502; LIDS-P-2190; No Copyright; Avail.: CASI: A03, Hardcopy
No abstract available
Reliability Analysis; Performance Tests

20070004844 Baker (Wilfred) Engineering, Inc., San Antonio, TX USA
On the Difficulty of Feature-Based Attentional Modulations in Visual Object Recognition: A Modeling Study
Jan 2004; 40 pp.; In English
Contract(s)/Grant(s): N00014-00-1-0907; IIS-0085836
Report No.(s): AD-A459484; AL MEMO 2004-004; CBCL MEMO 235; No Copyright; Avail.: CASI: A03, Hardcopy
No abstract available
Modulation; Pattern Recognition; Models

20070004869 Massachusetts Inst. of Tech., Cambridge, MA USA
Design of Error Detection Scheme for Class C Service in ATM
Jun 1993; 21 pp.; In English
Report No.(s): AD-A459477; LIDS-P-2187; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Detection; Errors

20070004894 California Univ., Santa Cruz, CA USA
Comparison of Floor Control Protocols for Collaborative Multimedia Environments
Jan 1998; 13 pp.; In English
Contract(s)/Grant(s): F19628-96-C-0038
Report No.(s): AD-A459468; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Multimedia; Protocol (Computers)

20070004896 California Univ., Santa Cruz, CA USA
Efficacy of Floor Control Protocols in Distributed Multimedia Collaboration
Jan 1999; 31 pp.; In English
Contract(s)/Grant(s): F19628-96-C-0038; DAAB07-97-C-D607
Report No.(s): AD-A459467; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Multimedia; Protocol (Computers)

Subject Term Index

ABILITIES
Development of Air Traffic Control Measurement Database – 8

ABORTED MISSIONS
Crew Exploration Vehicle Ascent Abort Coverage Analysis – 31

ACCELERATION (PHYSICS)
Series Connected Buck-Boost Regulator – 87

ACCELERATION TOLERANCE
Effects of Head Mounted Devices on Head-Neck Dynamic Response to +GZ Accelerations – 181

ACCELERATORS
History of the ZGS 500 MeV Booster – 265

ACCELEROMETERS
Angle Measurement System (AMS) for Establishing Model Pitch and Roll Zero, and Performing Single Axis Angle Comparisons – 25

ACCESS CONTROL
Assessment of Access Control Systems – 195
Hierarchical Role-based Viewing for Multi-level Information Security in Collaborative CAD – 307
How to Prevent Type-Flaw Guessing Attacks on Password Protocols – 215
Medium Access Control in Ad Hoc Networks With Omni-Directional and Directional Antennas – 67
Scalable Authorization in Role-Based Access Control Using Negative Permissions and Remote Authorization – 217

ACCIDENT INVESTIGATION
National Transportation Safety Board Aircraft Accident Report: Runway Overrun and Collision, Platinum Jet Management, LLC, Bombardier Challenger CL-600-1A11, N370V, Teterboro, New Jersey, on February 2, 2005 – 6

ACCIDENTS
A Summary of Unmanned Aircraft Accident/Incident Data: Human Factors Implications – 10

ACCRETION DISKS
Black Hole Spectral States and Physical Connections – 322

ACCURACY
Macromodeling CMOS Circuits for Timing Simulation – 95
Speed and Accuracy in Shallow and Deep Stochastic Parsing – 241
Study of Attrition Documentation at the U.S. Navy Recruit Training Command – 310
UMass at TREC 2003: HARD and QA – 312

ACIDS
Lysophosphatidic Acid Regulation and Roles in Human Prostate Cancer – 154

ACOUSTIC DELAY LINES
Aerodynamic Performance Measurements for a Forward Swept Low Noise Fan – 2

ACOUSTIC MEASUREMENT
Acoustic Measurements for Speaker Recognition – 282
International Electrotechnical Commission Standard IEC 61400-11 and Other Procedures. Acoustic Noise Measurement Techniques – 283

ACOUSTIC PROPERTIES
Use of Stochastic Modeling of Stratigraphic Relationships in High Resolution Seismic Reflection Data for Prediction of the Distribution of Acoustic and Geotechnical Property Variability in Near Surface Sediments on the East China Sea Continental Margin – 127

ACOUSTIC SCATTERING
Scattering of Evanescent Acoustic Waves by Regular and Irregular Objects – 282

ACOUSTICS
Characterization of Materials with Optically Shaped Acoustic Waveforms – 272
MEMS Based Acoustic Array – 281
Microphone-Independent Robust Signal Processing Using Probabilistic Optimum Filtering – 241
Performance, Thermal, and Vibration Qualification Testing of Zetec Acoustic Transducers, Model Z0002659-2, Sondicator Probes – 282
Simultaneous Linearized Inversion of Velocity and Density Profiles for Multidimensional Acoustic Media – 282

ACQUISITION
A Critical Analysis of the Acquisition Review Journal: Are We in Step with the Field? – 314
An Analysis of Earned Value Management Implementation Within the F-22 System Program Office's Software Development – 19
Analyzing the Structure of Air Force Space Acquisitions – 29

ACRYLONITRILES
Macroscopic Fiber Comprising Single-Wall Carbon Nanotubes and Acrylonitrile-Based Polymer and Process for Making the Same – 46

ACTINIDE SERIES
Relativistic Effects on the Equation of State of the Light Actinides – 279

ACTIVATED CARBON
Electrothermal Desorption of CWA Simulants from Activated Carbon Cloth – 39

ACTIVE CONTROL
Active Thermal Control System Development for Exploration – 328
High-Lift System for a Supercritical Airfoil: Simplified by Active Flow Control – 14

ACTUATORS
Cross-Lingual Lexical Triggers in Statistical Language Modeling – 244
Development of a Non-Linear Element Code for the Improvement of Piezoelectric Actuator Design and Reliability – 88
High-Lift System for a Supercritical Airfoil: Simplified by Active Flow Control – 14
Ionic Solvents Used in Ionic Polymer Transducers, Sensors and Actuators – 41
Optimal Control of Shock Wave Turbulent Boundary Layer Interactions Using Micro-Array Actuation – 2

ADAPTATION
Adaptation to New Microphones Using Tied-Mixture Normalization – 71
Development of Training Programs to Optimize Planetary Ambulation – 179
Mixing Story and Simulation in Interactive Narrative – 203
Multipath Mitigation Performance of Planar GPS Adaptive Antenna Arrays for Precision Landing Ground Stations – 95
Performance Analysis of Adaptive Transmission Aided by Long Range Channel Prediction for Realistic Single- and Multi-Carrier Mobile Radio Channels – 71

ADAPTIVE CONTROL
A Class of Adaptive Control Problems Solved via Stochastic Control – 207
A Hypothetical Perspective on the Relative Contributions of Strategic and Adaptive Control Mechanisms in Plastic Recalibration of Locomotor Heading Direction – 155

ADAPTIVE OPTICS
AO Group Annual Report – 320

ADENOSINE TRIPHOSPHATE
Competing for the Future: A Historical Review of NIST ATP Investments in Photonics and Optical Technologies – 87

ADHESION
Template-Growth of Highly Ordered Carbon Nanotube Arrays on Silicon POST-PRINT – 53

ADSORBENTS

Novel Anionic Clay Adsorbents for Boiler-Blow Down Waters Reclaim and Reuse. (Final Report, September 1, 2004-August 31, 2005) – 49

ADVANCED VERY HIGH RESOLUTION RADIOMETER

Model Calculations of Solar Spectral Irradiance in the 3.7 Micron Band for Earth Remote Sensing Applications – 141

AERIAL RECONNAISSANCE

A Need to Know: The Role of Air Force Reconnaissance in War Planning, 1945-1953 – 17

AEROACOUSTICS

Rotating Rake Mode Measurements Over Passive Treatment in a Ducted Fan – 283

AEROBRAKING

Autonomous Aerobraking Using Thermal Response Surface Analysis – 34

Probabilistic Thermal Analysis During Mars Reconnaissance Orbiter Aerobraking – 105

Titan Orbiter with Aerorover Mission (TOAM) – 319

AERODYNAMIC CHARACTERISTICS

Aerodynamic Analysis of Body-Strake Configurations – 5

Aerodynamic Performance Measurements for a Forward Swept Low Noise Fan – 2

Review of Cranked-Arrow Wing Aerodynamics Project: Its International Aeronautical Community Role – 12

AERODYNAMIC CONFIGURATIONS

High Altitude Long Endurance Air Vehicle Analysis of Alternatives and Technology Requirements Development – 14

High-Lift System for a Supercritical Airfoil: Simplified by Active Flow Control – 14

Review of Cranked-Arrow Wing Aerodynamics Project: Its International Aeronautical Community Role – 12

Statistical Analysis of CFD Solutions from the Third AIAA Drag Prediction Workshop – 243

USM3D Unstructured Grid Solutions for CAWAPI at NASA LaRC – 13

AERODYNAMIC HEATING

A Simplified Approach for the Rapid Generation of Transient Heat-Shield Environments – 34

AERODYNAMIC NOISE

Aerodynamic Performance Measurements for a Forward Swept Low Noise Fan – 2

AERODYNAMICS

Aerodynamic Analysis of Body-Strake Configurations – 5

AERONAUTICS

Review of Cranked-Arrow Wing Aerodynamics Project: Its International Aeronautical Community Role – 13

AEROSPACE ENGINEERING

Pressure Effects on Oxygen Concentration Flammability Thresholds of Materials for Aerospace Applications – 35

AEROSPACE ENVIRONMENTS

Characterization and Modeling of Bonded Piezoelectric Sensor Performance and Durability in Simulated Aircraft Environments (Preprint) – 17

Electron Beam Freeform Fabrication in the Space Environment – 319

Mission Success and Environmental Protection: Orbital Debris Considerations – 317

Radiation and Plasma Environments for Lunar Missions – 333

Space Operations – 28

AEROSPACE MEDICINE

A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series – 10

Conference Support - Surgery in Extreme Environments - Center for Surgical Innovation – 29

Effects of Microgravity on Human Spatial Orientation in Space Flight – 175

Index to FAA Office of Aerospace Medicine Reports: 1961 through 2004 – 17

Organization, Management and Function of International Space Station (ISS) Multilateral Medical Operations – 180

Protection Effects of a New Combined Anti-G Measure – 174

Research of Biomechanical Evaluation Methods of Hand Performance Fatigue – 178

Space Medicine and Medical Engineering, Volume 19, No. 5 – 174

AEROSPACE SYSTEMS

Analyzing the Structure of Air Force Space Acquisitions – 30

Fractionated Spacecraft Architectures Seeding Study – 30

AEROTHERMODYNAMICS

Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel – 26

AFRICA

Increasing Breast Cancer Surveillance Among African American Breast Cancer Survivors – 150

AFTERBODIES

NASA/MSFC's Calculation for Test Case 1a of ATAC-FSDC Workshop on After-body and Nozzle Flows – 102

AIR BREATHING ENGINES

Development of Supersonic Combustion Experiments for CFD Modeling – 106

The Art of Extracting One-Dimensional Flow Properties from Multi-Dimensional Data Sets – 24

AIR CONDITIONING

Floating Refrigerant Loop Based on R-134a Refrigerant Cooling of High-Heat Flux Electronics – 86

AIR CURRENTS

Guidance and Control of an Autonomous Soaring UAV – 25

AIR DEFENSE

The USAF Electric Propulsion Research Program (Postprint) – 88

Using Observer Ratings to Assess Situational Awareness in Tactical Air Environments – 6

AIR FILTERS

Resistance of HEPA Filters in a Ventilation Duct on Leakpath Factor Calcuations – 137

AIR FLOW

Clothing Ventilation Estimates From Manikin Measurements – 185

Textile Based Ventilation – 61

AIR MASSES

Turbulence and Mountain Wave Conditions Observed with an Airborne 2-Micron Lidar – 19

AIR POLLUTION

Comparison of Satellite Observations of Nitrogen Dioxide to Surface Monitor Nitrogen Dioxide Concentration – 135

Inventory of Sources and Environmental Releases of Dioxin-Like Compounds in the USA for the Years 1987, 1995, and 2000 – 138

Method and System for Treating Contaminants and Ordors in Airborne Emissions – 138

Model Validation and Spatial Interpolation by Combining Observations with Outputs from Numerical Models via Bayesian Melding – 244

National Symposium on Recent Advances in Pollutant Monitoring of Ambient Air and Stationary Sources, Held at Raleigh, North Carolina May 3-6, 1983 – 138

Review of Hazardous Chemical Species Associated with CO2 Capture from Coal-Fired Power Plants and their Potential Fate during CO2 Geologic Storage – 136

Study of Stability Conditions in an Urban Area – 139

AIR QUALITY

Arizona Department of Environmental Quality: Air Quality Annual Report, 2005 – 139

NERL Air Quality Research: Moving Forward. EPA-NOAA Scientists-to-Scientists Meeting. Held on March 2-3, 2004 – 137

Passive Badge Assessment for Long-Term, Low-Level Air Monitoring on Submarines: VOC Badge Validation – 44

Reduced Air Emissions for Hard Chrome Plating at the NADEP NAS North Island, San Diego Using an Alternative Emission Control Technology – 140

AIR SAMPLING

Chemical Agent Detector – 139

National Symposium on Recent Advances in Pollutant Monitoring of Ambient Air and Stationary Sources, Held at Raleigh, North Carolina May 3-6, 1983 – 138

AIR TRAFFIC CONTROLLERS (PERSONNEL)

Development of Air Traffic Control Measurement Database – 8

AIR TRAFFIC CONTROL

Complexity and Automation Displays of Air Traffic Control: Literature Review and Analysis – 12

Development of Air Traffic Control Measurement Database – 7

Next Generation Air Transportation System: Progress and Challenges Associated with the Transformation of the National Airspace System – 8

AIR TRAFFIC

Complexity and Automation Displays of Air Traffic Control: Literature Review and Analysis – 12

AIR TRANSPORTATION

Next Generation Air Transportation System 2005 Progress Report – 7

Next Generation Air Transportation System Integrated Plan – 7

Next Generation Air Transportation System: Progress and Challenges Associated with the Transformation of the National Airspace System – 8

AIR WATER INTERACTIONS

Alfven Waves in the Solar Wind, Magnetosheath, and Outer Magnetosphere – 333

AIRBORNE EQUIPMENT

Turbulence and Mountain Wave Conditions Observed with an Airborne 2-Micron Lidar – 19

AIRBORNE/SPACEBORNE COMPUTERS

Coloured Petri Net Modelling of a Generic Avionics Mission Computer – 200

AIRCRAFT ACCIDENTS

A Summary of Unmanned Aircraft Accident/Incident Data: Human Factors Implications – 10

Operational Interventions to Maintenance Error – 5

AIRCRAFT CONTROL

Feedback Linearized Aircraft Control Using Dynamic Cell Structure – 25

Tailored Excitation for Frequency Response Measurement Applied to the X-43A Flight Vehicle – 25

AIRCRAFT FUELS

A Comparison of the Navy and the Air Force Budgeting and Execution Process for Aviation Fuel (AVFUEL) – 64

AIRCRAFT MAINTENANCE

Operational Interventions to Maintenance Error – 6

AIRCRAFT PERFORMANCE

Human Factors Considerations for Performance-Based Navigation – 5

AIRCRAFT SAFETY

Index to FAA Office of Aerospace Medicine Reports: 1961 through 2004 – 18

AIRCRAFT STRUCTURES

Incorporation of Half-Cycle Theory Into Ko Aging Theory for Aerostructural Flight-Life Predictions – 122

AIRCRAFT

Cost Valuation: A Model for Comparing Dissimilar Aircraft Platforms – 19

Process Improvement at the Aircraft Intermediate Maintenance Detachment (AIMD) at Naval Air Station Whidbey Island – 5

AIRFRAMES

Solid Oxide Fuel Cell APU Feasibility Study for a Long Range Commercial Aircraft Using UTC ITAPS Approach – 23

AIRGLOW

Telescopic Imaging of Heater-Induced Airglow at HAARP – 326

AIRLINE OPERATIONS

The Maintenance Costs of Aging Aircraft: Insights from Commercial Aviation – 27

AIRPORTS

Evaluation and Integration of Texas Airports into the Trans-Texas Corridor, Project Summary – 8

Seismic Measurement of Concrete Strength Properties – 27

Trans-Texas Corridor and the Texas Airport System: Opportunities and Challenges – 11

AIRSHIPS

Project Clinker, Hydraulic Carriage for Airship Installation of Optical Equipment – 16

AIRSPEED

Turbulence and Mountain Wave Conditions Observed with an Airborne 2-Micron Lidar – 19

ALGORITHMS

A Capacity Scaling Algorithm for the Constrained Maximum Flow Problem – 230

A Comparison of Power-Efficient Broadcast Routing Algorithms – 132

A Hierarchical Algorithm for Neural Training and Control. Revision – 236

A Novel Power-Efficient Broadcast Routing Algorithm Exploiting Broadcast Efficiency – 132

A Parallel Line Detection Algorithm Based on HMM Decoding – 193

A Technique for Speeding Up the Solution of the Lagrangean Dual – 192

Algorithm for the Iterative Design of Observer Field Tests – 65

Algorithms using Java for Spreadsheet Dependent Cell Recomputation – 240

An Optimal Parallel Implementation of a Quadratic Transportation Algorithm – 206

Analytical Verification of Undesirable Properties of Direct Model Reference Adaptive Control Algorithms – 250

Bilinear Mixed Effects Models for Dyadic Data – 245

BSAR Computational Analysis and Proposed Mapping. Revision 1 – 238

Design Issues on Broadcast Routing Algorithms using Realistic Cost-Effective Smart Antenna Models – 237

Efficient Subtorus Processor Allocation in a Multi-Dimensional Torus – 197

Estimating Grammar Parameters using Bounded Memory – 239

Estimation and Detection with Chaotic Systems – 243

Evaluation of TCP Congestion Control Algorithms on the Windows Vista Platform – 263

Extensions of Proportional-Fair Sharing Algorithms for Multi-Access Control of Mobile Communications: Constraints, Finite Queues and Bursty Data Processes – 72

Fast Decoding and Optimal Decoding for Machine Translation – 239

Fast Search Algorithms for Connected Phone Recognition Using the Stochastic Segment Model – 235

Fully Automatic Cross-Associations – 302

Incremental Model-Based Clustering for Large Datasets With Small Clusters – 254

Is N-Best Dead? – 241

Layer by Layer Reconstruction Methods for the Earth Resistivity from Direct Current Measurements – 236

Mesh Partitioning with Ant Colonies – 76

Metropolis-type Annealing Algorithms for Global Optimization in IRd – 231

Microphone-Independent Robust Signal Processing Using Probabilistic Optimum Filtering – 241

Modeling, Analysis, Simulation, and Synthesis of Biomolecular Networks – 162

Multiresolution Optimal Interpolation and Statistical Analysis of Topex/Poseidon Satellite Altimetry – 238

On Achieving Fairness in the Joint Allocation of Processing and Bandwidth Resources: Principles and Algorithms – 232

On Developing Theory and Application of Community Generation – 256

On Sampling Methods and Annealing Algorithms – 192

Parallel Algorithms for the Assignment and Minimum-Cost Flow Problems – 252

Parallel Smoothing Algorithms for Casual and Acausal Systems – 232

Phase Effects on Mesoscale Object X-ray Attenuation Radiographs – 259

Quantum Gate Decomposition Algorithms – 268

Rollout Algorithms for Stochastic Scheduling Problems – 234

Simulated Annealing Type Algorithms for Multivariate Optimization – 248

Some Issues at Sampled-Data Identification and Conversion of the Identified Models into the Continuous-Time Domain – 75

Statistical Comparisons of Classifiers in Machine Learning – 79

Stereo Matching by Hierarchical, Microcanonical Annealing – 249

Survey of Codes and Algorithms Used in NERSC Material Science Allocations – 188

Temporal Analysis of Social Networks Using Three-Way DEDICOM – 198

The Schur Algorithm and Its Applications – 232

Three Dimensional Reconstruction Algorithm for Imaging Pathophysiological Signals Within Breast Tissue Using Near Infrared Light – 154

Two Algorithms for Learning the Parameters of Stochastic Context-Free Grammars – 239

ALIGNMENT

FY 2005 Quantum Cascade Laser Alignment System. Final Report – 290

Statistical Alignment Models in Machine Translation from Slovenian to English – 186

ALIPHATIC HYDROCARBONS

In-situ micro-FTIR Study of Thermal Changes of Organics in Tagish Lake Meteorite: Behavior of Aliphatic Oxygenated Functions and Effects of Minerals – 329

ALLENDE METEORITE

The Origin of Dark Inclusions in Allende: New Evidence from Lithium Isotopes – 331

ALLOCATIONS

Parallel Algorithms for the Assignment and Minimum-Cost Flow Problems – 253

Survey of Codes and Algorithms Used in NERSC Material Science Allocations – 188

ALLOYS

Development of GRCop-84 for Rocket Engine Applications – 56

Effect of Solution Annealing on Alloy 22 Weld Properties – 54

ALPHA DECAY

Plutonium-238 Alpha-Decay Damage Study of the Ceramic Waste Form – 59

ALTERNATING CURRENT

Floating Refrigerant Loop Based on R-134a Refrigerant Cooling of High-Heat Flux Electronics – 86

Phase I Cultural Resources Survey and Archeological Inventory of a Proposed 1.12 ha (2.87 ac) Borrow Pit and an Associated Access Road, Ascension Parish, Louisiana – 126

Possibilities and Limitations of Electric Power Transmission Over Long Distances Part 2 - Long distance AC transmission – 78

Possibilities and Limitations of Electric Power Transmission Over Long Distances – 80

ALTERNATIVES

Risk-Based Decision Support of Water Resource Management Alternatives – 251

ALTITUDE SICKNESS

Validation of a Shortened Electronic Version of the Environmental Symptoms Questionnaire – 161

ALUMINUM ALLOYS

Precipitation in Al-Zn-Mg-Cu Alloys Modified With Sc and Zr During Aging (Preprint) – 55

The Effects of Laser Peening and Shot Peening on Mechanical Properties in Friction Stir Welded 7075-T7351 Aluminum – 54

ALUMINUM GALLIUM ARSENIDES

Voltage-Controlled Tunable GaAs/AlGaAs Multistack Quantum Well Infrared Detector – 108

ALUMINUM NITRIDES

Aluminum Nitride Substrate Growth by Halide Vapor Transport Epitaxy – 53

ALUMINUM OXIDES

Template-Growth of Highly Ordered Carbon Nanotube Arrays on Silicon POSTPRINT – 53

AMINES

Dietary Heterocyclic Amines and Polymorphic Variants in the Etiology of Prostate Cancer – 160

AMORPHOUS MATERIALS

Enzyme-Encapsulated Silica Monolayers for Rapid Functionalization of a Gold Surface PREPRINT – 50

Polymeric Bioresorbable Composites Containing an Amorphous Calcium Phosphate Polymer Ceramic for Bone Repair and Replacement – 45

AMPLIFICATION

Electron Transfer Reactivity Patterns at Chemically Modified Electrodes: Fundamentals and Application to the Optimization of Redox Recycling Amplification Systems – 49

Modeling the Observed Solar Cycle Variations of the Quasi-biennial Oscillation (QBO): Amplification by Wave Forcing – 144

AMPLIFIERS

Digital Nulling Pulse Inductive Metal Detector – 91

ANAEROBES

Trichococcus Patagoniensis sp. nov., a Facultative Anaerobe that grows at -5 C, Isolated from Penguin Guano in Chilean Patagonia – 155

ANALOG TO DIGITAL CONVERTERS

Dispersion Management in a Harmonically Mode-Locked Fiber Soliton Laser – 111

ANALOGS

Antineoplastic Efficacy of Novel Polyamine Analogues in Human Breast Cancer – 166

ANALYSIS (MATHEMATICS)

BSAR Computational Analysis and Proposed Mapping. Revision 1 – 238

Direct Measurement of Geometric and Resistive Wakefields in Tapered Collimators for the International Linear Collider – 267

ANALYSIS OF VARIANCE

Software Tool for Analysis of Variance of DNA Microarray Data – 163

Uncertainty Analysis of Historical Hurricane Data – 145

ANALYZERS

Seismic Measurement of Concrete Strength Properties – 27

ANALYZING

Near-Infrared Fuel Analysis – 63

ANEMOMETERS

Automation & Characterization of US Air Force Bench Top Wind Tuunnels. Summary Report – 27

ANGIOGENESIS

Novel Angiogenic Domains: Use in Identifying Unique Transforming and Tumor Promoting Pathways in Human Breast Cancer – 162

ANGIOTENSINS

Effects of Tail Suspension on Renin-angiotensin System in Rat Myocardium – 177

ANGLES (GEOMETRY)

Angle Measurement System (AMS) for Establishing Model Pitch and Roll Zero, and Performing Single Axis Angle Comparisons – 25

Method for Correcting Control Surface Angle Measurements in Single Viewpoint Photogrammetry – 12

ANGULAR CORRELATION

Parton Bubble Model for Two Particle Angular Correlations at RHIC/LHC – 261

ANGULAR MOMENTUM

Parton Orbital Angular Momentum – 262

ANGULAR VELOCITY

Fast Access, Low Memory, Pair Catalog – 1

ANIONS

Novel Anionic Clay Adsorbents for Boiler-Blow Down Waters Reclaim and Reuse. (Final Report, September 1, 2004-August 31, 2005) – 49

ANISOTROPY

A Dynamic/Anisotropic Low Earth Orbit (LEO) Ionizing Radiation Model – 334

ANNEALING

Effect of Solution Annealing on Alloy 22 Weld Properties – 54

High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems – 57

Metropolis-type Annealing Algorithms for Global Optimization in IRd – 231

On Sampling Methods and Annealing Algorithms – 192

Stereo Matching by Hierarchical, Microcanonical Annealing – 249

ANNUAL VARIATIONS

Mesospheric Dynamical Changes Induced by the Solar Proton Events in October-November 2003 – 145

ANODES

Carbon Materials Metal/Metal Oxide Nanoparticle Composite and Battery Anode Composed of the Same – 44

ANOMALIES

State of the Art in Anomaly Detection and Reaction: An Update – 207

State of the Art in Anomaly Detection and Reaction – 124

ANTENNA ARRAYS

High Power Spatial Combiners: Tile and Tray Approaches – 99

Multipath Mitigation Performance of Planar GPS Adaptive Antenna Arrays for Precision Landing Ground Stations – 95

ANTENNA DESIGN

A Wide-Aperture HF Direction-Finder with Sleeve Antennas – 67

Metamaterial Scanning Lens Antenna Systems and Methods – 70

ANTENNA FEEDS

A Low-Sidelobe Partially Overlapped Constrained Feed Network for Time-Delayed Subarrays – 99

ANTENNAS

Radiation and Scattering Compact Antenna Laboratory – 97

Step Current Inductive Antenna for Pulse Inductive Metal Detector – 91

ANTIBIOTICS

Silanols, a New Class of Antimicrobial Agent – 153

ANTIBODIES

Anti-HMGB1 Antibodies and Alpha-7 Agonists as Experimental Therapeutics as BW Countermeasures – 153

Enhancing the Immunogenicity of a Dengue-2 DNA Vaccine with Adjuvants and Anti-Fc(gamma)RI Antibodies – 163

ANTIGENS

Prostate Derived Ets Factor, an Immunogenic Breast Cancer Antigen – 166

Spatial-Temporal Mapping of the T Cell Receptor NF-kappaB Signaling Pathway – 152

ANTIGRAVITY

Protection Effects of a New Combined Anti-G Measure – 175

Responding to Mechanical Antigravity – 37

ANTIINFECTIVES AND ANTIBACTERIALS

Silanols, a New Class of Antimicrobial Agent – 153

APERTURES

A Wide-Aperture HF Direction-Finder with Sleeve Antennas – 67

An Inductively Coupled Goniometer for Wide-Aperture DF Arrays – 286

MEMS Microshutter for James Webb Space Telescope – 318

Ultra Small Aperture Terminal (USAT) Phased Array Technology Demonstrator – 99

APOPTOSIS

Breast Cancer Prevention by Inducing Apoptosis in DCIS Using Breast Ductal Lavage – 168

Rational Design of Regulators of Programmed Cell Death in Human Breast Cancer – 163

APPLICATION PROGRAMMING INTERFACE

The Case for an Open Data Model – 202

APPLICATIONS OF MATHEMATICS

Generalized Riccati Equations for Two-Point Boundary-Value Descriptor Systems – 231

Large Deviations and Applications: The Finite Dimensional Case – 189

Realization Theory for Deterministic Boundary-Value Descriptor Systems – 186

APPROACH

Simulation Study on Performance of Control by Man and Machine in the Stage of Final Approaching for Rendezvous and Docking – 175

APPROXIMATION

Fast Approximation Schemes for Multi-Criteria Flow, Knapsack, and Scheduling Problems – 230

Lattice Approximation in the Stochastic Quantization of (04)2 Fields – 237

AQUIFERS

Chemical Character of Ground Water in the Shallow Water-Table Aquifer at Selected Localities in the Memphis Area, Tennessee – 38

Installation and Sampling of Observation Wells and Analyses of Water From the Shallow Aquifer at Selected Waste-Disposal Sites in the Memphis Area, Tennessee – 123

ARC JET ENGINES

Arcjet Semi-Elliptic Nozzle Simulations and Validation in Support of TPS Testing – 101

ARCHAEOLOGY

Phase I Cultural Resources Survey and Archeological Inventory of a Proposed 1.12 ha (2.87 ac) Borrow Pit and an Associated Access Road, Ascension Parish, Louisiana – 127

ARCHITECTURE (COMPUTERS)

A Model-Driven Architecture Approach for Modeling, Specifying and Deploying Policies in Autonomous and Autonomic Systems – 225

Analytical Design of Evolvable Software for High-Assurance Computing – 208

Coloured Petri Net Modelling of a Generic Avionics Mission Computer – 200

Global Grid Architecture Concept – 303

Implementation-Oriented Secure Architectures – 214

Joint Fire Support in 2020: Development of a Future Joint Fires Systems Architecture for Immediate, Unplanned Targets – 214

Model-driven Architecture and Its Impact on the Software Development Process – 81

NASA CEV Reference GN&C Architecture – 21

Softswitch Architecture Remodelling for New Generation IP Multimedia Subsystem Environment – 79

AREA NAVIGATION

Human Factors Considerations for Performance-Based Navigation – 5

ARGON ISOTOPES

Ar-39-Ar-40 Ages of Two Nakhlites, MIL03346 and Y000593: A Detailed Analysis – 327

ARGON

Multispectral X-Ray Imaging for Core Temperature and Density Maps Retrieval in Direct Drive Implosions – 272

ARITHMETIC AND LOGIC UNITS

Procedural Layout of a High-Speed Floating-Point Arithmetic Unit – 94

ARMED FORCES (UNITED STATES)

A Comparison of the Navy and the Air Force Budgeting and Execution Process for Aviation Fuel (AVFUEL) – 64

ARMED FORCES

Right-Wing Extremism in Germany and the Consequences for the Armed Forces (Rechtsextreme orientierungen in deutschland und ihre folgen fuer die bundeswehr) – 336

ARMOR

Forced Ventilation of Protective Garments for Hot Industries – 185

Industry Analysis for Body Armor Procurement – 186

Use of a Spacer Vest to Increase Evaporative Cooling Under Military Body Armor – 297

ARRAYS

MEMS Based Acoustic Array – 282

Ultra Small Aperture Terminal (USAT) Phased Array Technology Demonstrator – 99

ARROW WINGS

Review of Cranked-Arrow Wing Aerodynamics Project: Its International Aeronautical Community Role – 13

USM3D Unstructured Grid Solutions for CAWAPI at NASA LaRC – 13

ARTICULATION (SPEECH)

Dynamic Articulatory Model of Speech Production Using Computer Simulation – 69

ARTIFICIAL INTELLIGENCE

A Formal Theory of Knowledge and Action – 223

A Mobile Automaton: An Application of Artificial Intelligence Techniques – 221

Birds of a Feather: Supporting Secure Systems – 194

Building Explainable Artificial Intelligence Systems – 223

Building Robust Planning and Execution Systems for Virtual Worlds – 203

Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative – 311

Dealing with Out of Domain Questions in Virtual Characters – 219

Evaluating a Computational Model of Social Causality and Responsibility – 254

Explainable Artificial Intelligence for Training and Tutoring – 220

Fitting APD Restitution with Artificial Neural Network – 174

IDA: An Intelligent Data Access Program – 222

Intelligent Agents for Computer-Generated Forces – 9

Introduction to SPARK. Version 0.3 – 204

Monitored Execution of Robot Plans Produced by Strips – 221

QLISP: A Language for the Interactive Development of Complex Systems – 204

Reflective Tutoring for Immersive Simulation – 220

Space Medicine and Medical Engineering, Volume 19, No. 5 – 174

Statistical Comparisons of Classifiers in Machine Learning – 79

The Database as Model: A Metatheoretic Approach – 314

The DINO Parallel Programming Language – 206

Towards Integrating AI Story Controllers and Game Engines: Reconciling World State Representations – 201

ARTIFICIAL SATELLITES

Developing an Inflatable Solar Array – 31

Electrodynamic Tether – 32

ASCENT

Crew Exploration Vehicle Ascent Abort Coverage Analysis – 31

ASPHALT

Performance Comparison of Hot Rubber Crack Sealants to Emulsified Asphalt Crack Sealants – 42

Seismic Measurement of Concrete Strength Properties – 27

ASSAYING

Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics – 161

ASSESSMENTS

The Role of Dosimetry in High-Quality EMI Risk Assessment – 140

ASTHMA

Implementation of the Asthma Practice Guideline in the Army Medical Department: Evaluation of Process and Effects – 162

ASTRONAUT LOCOMOTION

Development of Training Programs to Optimize Planetary Ambulation – 180

ASTRONAUT TRAINING

Development of Training Programs to Optimize Planetary Ambulation – 180

ASTRONAUTS

Development of Training Programs to Optimize Planetary Ambulation – 180

Study on Operational Reliability of Astronaut in Spacecraft Cabin – 178

ASTRONOMY

The Scientific Program of the U.S. Naval Research Laboratory – 322

ASTROPHYSICS

Direct Imaging of Stellar Surfaces: Results from the Stellar Imager (SI) Vision Mission Study – 325

Inverse Compton Scattering on Solar Photons, Heliospheric Modulation, and Neutrino Astrophysics – 322

Nuclear Reaction and Structure Databases of the National Nuclear Data Center – 323

The Scientific Program of the U.S. Naval Research Laboratory – 322

ASYMMETRY

Local Duality in Spin Structure Functions g1(p) and g1(d) – 278

Measurement of Decay Amplitudes of B to ccbar K asterik with an Angular Analysis, for ccbar=J/Psi, Psi2S and chic 1. The BABAR Collaboration – 267

Measurement of Time-Dependent CP Asymmetries in B(sup 0) Yields K(sup 0)(sub s) Decays. The BABAR Collaboration – 268

Spin Structure Functions: Proton/Deuteron Measurements in the Resonance Region – 276

Temporal Analysis of Social Networks Using Three-Way DEDICOM – 198

ASYMPTOTES

Analysis, Estimation, and Control for Perturbed and Singular Systems and for Systems Subject to Discrete Events – 250

ASYMPTOTIC METHODS

Asymptotic Orders of Reachability in Perturbed Linear Systems – 189

ATMOSPHERIC CIRCULATION

Mesospheric Dynamical Changes Induced by the Solar Proton Events in October-November 2003 – 145

ATMOSPHERIC HEAT BUDGET

Global, Multi-Year Analysis of Clouds and Earth's Radiant Energy System Terra Observations and Radiative Transfer Calculations – 142

ATMOSPHERIC RADIATION

Global, Multi-Year Analysis of Clouds and Earth's Radiant Energy System Terra Observations and Radiative Transfer Calculations – 142

Validation of the Archived CERES Surface and Atmosphere Radiation Budget (SARB) at SGP – 142

ATROPHY

Prophylactic Effects of Choline Chloride on Muscle Atrophy in Tail-suspended Rats – 177

ATTITUDE CONTROL

Fast Access, Low Memory, Pair Catalog – 1

ATTITUDE (INCLINATION)

Autonomous Aerobraking Using Thermal Response Surface Analysis – 34

Effects of Microgravity on Human Spatial Orientation in Space Flight – 175

ATTRACTORS (MATHEMATICS)

Exact Attractive Non-BPS STU Black Holes – 326

AUDIO EQUIPMENT

Report Back from the NCI-Wide Workshop: Enhancing Interactions to Reduce Cancer Health Disparities. Held on July 17th, 2006 – 306

AUGMENTATION

Cooling Enhancement Using Inhomogeneous Thermoelectric Materials – 298

Enhancement of Stochastic Resonance by Tuning System Parameters and Adding Noise Simultaneously – 248

Enhancement of Stochastic Resonance Using Optimization Theory – 249

Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel – 26

AURORAS

Telescopic Imaging of Heater-Induced Airglow at HAARP – 326

AUTOMATA THEORY

A Boolean Approach to Unbounded, Fully Symbolic Model Checking of Timed Automata – 257

A Unified Construction of the Glushkov, Follow, and Antimirov Automata – 219

AUTOMATIC CONTROL

A Deception Repeater for Conical-Scan Automatic Tracking Radars – 108

Development of a Complex Experimental System for Studies of Controlled Ecological Life Support Technique – 175

Fully Automatic Cross-Associations – 302

Intelligent Weather Agent – 112

Output Stabilizability of Discrete Event Dynamic Systems – 235

AUTOMATIC PILOTS

Guidance and Control of an Autonomous Soaring UAV – 25

AUTOMATION

A Mobile Automaton: An Application of Artificial Intelligence Techniques – 221

AUTOMOBILES

Energy Absorber for Vehicle Occupant Safety and Survivability – 184

Floating Refrigerant Loop Based on R-134a Refrigerant Cooling of High-Heat Flux Electronics – 85

AUTONOMOUS NAVIGATION

An Autonomous Glider Network for the Monterey Bay Predictive Skill Experiment / AOSN-II – 10

Design of Autonomous Navigation Controllers for Unmanned Aerial Vehicles Using Multi-Objective Genetic Programming – 18

NASA CEV On-Orbit GN&C Analysis – 35

NASA CEV Reference Entry GN&C System and Analysis – 21

Titan Orbiter with Aerorover Mission (TOAM) – 319

AUTONOMY

A Model-Driven Architecture Approach for Modeling, Specifying and Deploying Policies in Autonomous and Autonomic Systems – 225

An Autonomous Glider Network for the Monterey Bay Predictive Skill Experiment / AOSN-II – 10

Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative – 311

Guidance and Control of an Autonomous Soaring UAV – 25

Powered Descent Trajectory Guidance and Some Considerations for Human Lunar Landing – 331

AUTOREGRESSIVE PROCESSES

Multi-Scale Autoregressive Processes – 242

AUXILIARY POWER SOURCES

Solid Oxide Fuel Cell APU Feasibility Study for a Long Range Commercial Aircraft Using UTC ITAPS Approach – 23

AVERAGE

Long-Run Performance of Bayesian Model Averaging – 233

AVIONICS

Coloured Petri Net Modelling of a Generic Avionics Mission Computer – 200

Dual Use of Commercial Avionics Data Links for the U.S. Air Force – 73

NASA CEV Reference Entry GN&C System and Analysis – 21

NASA CEV Reference GN&C Architecture – 21

AXIAL LOADS

Bearing-Load Modeling and Analysis Study for Mechanically Connected Structures – 116

AXONS

Fiber Optic Detection of Action Potentials in Axons – 287

The Oligodendrocyte Progenitor Response to Demyelination – 151

B-52 AIRCRAFT

Incorporation of Half-Cycle Theory Into Ko Aging Theory for Aerostructural Flight-Life Predictions – 122

BACILLUS

Biological Restoration of Major Transportation Facilities Domestic Demonstration and Application Project (DDAP): Technology Develop(ment aat Sandia National Laboratories – 60

Fully Virulent Bacillus Anthracis Does Not Require the Immunodominant Protein BclA for Pathogenesis – 164

Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 164

BACKPROPAGATION (ARTIFICIAL INTELLIGENCE)

Variable Background Born Inversion by Wavefield Backpropagation – 188

BACTERIA

Evolution of Catabolic Pathways for Synthetic Compounds Bacterial Pathways for Degradation of 2,4-dinitrotoluene and Nitrobenzene – 164

BACTERIOPHAGES

Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 165

BAINITIC STEEL

Fracture Toughness and Strength in a New Class of Bainitic Chromium-Tungsten Steels – 46

BALL BEARINGS

Characterization of Lubricants on Ball Bearings by FT-IR Using an Integrating Sphere – 52

BANDWIDTH

On Achieving Fairness in the Joint Allocation of Processing and Bandwidth Resources: Principles and Algorithms – 232

BARIUM OXIDES

Enhanced Pinning in YBCO Films with Bazro3 Nanoparticles – 294

BARIUM TITANATES

Radio Frequency Applications of Barium Strontium Titanate Thin Film Tunable Capacitors – 97

BARYONS

Baryon-Strangness Correlations: A Diagnostic of Strongly Interacting Matter – 273

Jefferson Lab Phenomenology: Selected Highlights – 277

New Perspectives for QCD From AdS/CFT – 259

BATCH PROCESSING

LIFT - The LIsp Framework for Testing – 211

BAYES THEOREM

Adaptive Bayesian Signal Reconstruction with A Priori Model Implementation and Synthetic Examples for X-Ray Crystallography – 242

Bayesian Inference for Color Image Quantization via Model-Based Clustering Trees – 191

Choosing the Link Function and Accounting for Link Uncertainty in Generalized Linear Models using Bayes Factors – 192

Determining the Number of Colors or Gray Levels in an Image Using Approximate Bayes Factors: The Pseudolikelihood Information Criterion (PLIC) – 245

Easy Computation of Bayes Factors and Normalizing Constants for Mixture Models via Mixture Importance Sampling – 245

Easy Estimation of Normalizing Constants and Bayes Factors from Posterior Simulation: Stabilizing the Harmonic Mean Estimator – 246

Long-Run Performance of Bayesian Model Averaging – 233

Model Validation and Spatial Interpolation by Combining Observations with Outputs from Numerical Models via Bayesian Melding – 244

Robust Estimation of cDNA Microarray Intensities with Replicates – 245

Using Bayesian Model Averaging to Calibrate Forecast Ensembles – 146

BEACHES

Evaluating a Prefabricated Submerged Breakwater and Double-T Sill for Beach Erosion Prevention, Cape May Point, NJ – 147

BEAMS (RADIATION)

Characterization of the Pep-II Colliding-Beam Phase Space by the Boost Method – 264

BEARINGLESS ROTORS

A Bearingless Switched-Reluctance Motor for High Specific Power Applications – 23

BEARINGS

Bearing-Load Modeling and Analysis Study for Mechanically Connected Structures – 116

BENDING

Orbiter Gap Filler Bending Model for Reentry – 33

BERYLLIUM ISOTOPES

Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 325

BETATRONS

Vertical Beam Size Control in TLS and TPS – 275

BIAS

Bias-Adjusted Giant Magnetoresistive (GMR) Devices for Magnetic Random Access Memory (MRAM) Applications – 70

Evaluating a Computational Model of Social Causality and Responsibility – 254

BIBLIOGRAPHIES

Ecology, Environmental Research at Argonne National Laboratory, 1955-1985 – 303

Human Dimensions of Strategic Leadership: A Selected Bibliography – 299

BIMETALS

Magnetoelectric Multilayer Composites for Field Conversion – 91

BINARY DIGITS

Real-Time High-Dynamic Range Texture Mapping – 199

BINARY PHASE SHIFT KEYING

Optical Regenerative Amplifier for Binary Phase Shift-Keying Signals – 289

BIOCHEMISTRY

Evolution of Catabolic Pathways for Synthetic Compounds Bacterial Pathways for Degradation of 2,4-dinitrotoluene and Nitrobenzene – 164

Simulation of Biomolecular Nanomechanical Systems – 160

BIODEGRADABILITY

Biodegradability of JP-8 Fuel in the Aquatic Environment – 63

Coatings and Biodegradable and Bioabsorbable Films – 169

BIODEGRADATION

Coatings and Biodegradable and Bioabsorbable Films – 169

BIODYNAMICS

Research of Biomechanical Evaluation Methods of Hand Performance Fatigue – 178

BIOENGINEERING

Space Medicine and Medical Engineering, Volume 19, No. 5 – 174

BIOLOGICAL EFFECTS

Simulation of Biomolecular Nanomechanical Systems – 160

BIOLOGICAL EVOLUTION

Frontiers in Evolutionary Biology. Report of a Workshop – 195

BIOLOGICAL HAZARDS

Application of NASA's Advanced Life Support Technologies in Polar Regions – 148

BIOLOGICAL WEAPONS

Biological Restoration of Major Transportation Facilities Domestic Demonstration and Application Project (DDAP): Technology Develop(ment aat Sandia National Laboratories – 60

The National Biodefense Analysis and Countermeasures Center: Issues for Congress – 152

BIOMARKERS

Natural Calcium Isotopic Composition of Urine as a Marker of Bone Mineral Balance – 156

Role of Estrogen Metabolism in the Initiation of Prostate Cancer: Biomarkers of Susceptibility and Early Detection – 153

BIOMIMETICS

Compression and Instrumented Indentation Measurements on Biomimetic Polymers – 40

Simulation of Biomolecular Nanomechanical Systems – 160

BIONICS

A Biological Model of Object Recognition with Feature Learning – 222

BIOREACTORS

An Optimization of Pulsed ElectroMagnetic Fields Study – 156

BIOSYNTHESIS

Modeling, Analysis, Simulation, and Synthesis of Biomolecular Networks – 162

BIOTECHNOLOGY

Showcase for Biotechnology 2005 – 149

BIOT-SAVART LAW

Parallel Computer Implementation of Fast Low-Rank QR Approximation of the Biot-Savart Law – 188

BIPOLARITY

GHz Modulation of GaAs-Based Bipolar Cascade VCSELs (Preprint) – 86

BIREFRINGENCE

Analysis of PMD Compensators With Fixed DGD Using Importance Sampling – 98

BLACK BODY RADIATION

Development of the System for Determination of the Size-of-Source Effect – 76

Uncertainty of the Characteristic of the Size-of-Source Effect in Radiation Thermometers – 82

BLACK HOLES (ASTRONOMY)

Black Hole Spectral States and Physical Connections – 322

Exact Attractive Non-BPS STU Black Holes – 326

GRO J1655-40: Early Stages of the 2005 Outburst – 320

The ROSSI X-Ray Timing Explorer: Capabilities, Achievements and Aims – 325

BLADDER

Protection Effects of a New Combined Anti-G Measure – 175

BLOCK COPOLYMERS

Spatial Position Control of CdS Nanoclusters using a Self-Assembled Diblock Copolymer Template – 62

BLOWING

Novel Anionic Clay Adsorbents for Boiler-Blow Down Waters Reclaim and Reuse. (Final Report, September 1, 2004-August 31, 2005) – 49

Parametric Evaluation of Thin, Transonic Circulation-Control Airfoils – 3

Theoretical Considerations Governing the Dehydration of Fuels by Gas Blowing – 43

BODY KINEMATICS

Effects of Speed and Visual-Target Distance on Toe Trajectory During the Swing Phase of Treadmill Walking – 157

BODY WEIGHT

Weight Measurements and Standards for Soldiers – 165

BOEING 777 AIRCRAFT

Progress in Flaps Down Flight Reynolds Number Testing Techniques at the NTF – 12

Solid Oxide Fuel Cell APU Feasibility Study for a Long Range Commercial Aircraft Using UTC ITAPS Approach – 22

Statistical Loads Data for the Boeing 777-200ER Aircraft in Commercial Operations – 15

BOILERS

Novel Anionic Clay Adsorbents for Boiler-Blow Down Waters Reclaim and Reuse. (Final Report, September 1, 2004-August 31, 2005) – 49

BOMBER AIRCRAFT

Transport Bombers: A Conceptual Shift in Precision-Guided Munitions Delivery – 16

BONDED JOINTS

Laser Shearography Inspection of TPS (Thermal Protection System) Cork on RSRM (Reusable Solid Rocket Motors) – 116

BONDING

Rare-earth Transition-Metal Intermetallics: Structure-Bonding-Property Relationships – 48

BONE MINERAL CONTENT

Natural Calcium Isotopic Composition of Urine as a Marker of Bone Mineral Balance – 156

BONES

Bone Geometry as a Predictor of Tissue Fragility and Stress Fracture Risk – 151

Enhancing Bone Accretion Using Short Duration, Low-Level Mechanical Vibrations – 154

Exercise and Bone Density: Meta-Analysis – 151

Natural Calcium Isotopic Composition of Urine as a Marker of Bone Mineral Balance – 155

Polymeric Bioresorbable Composites Containing an Amorphous Calcium Phosphate Polymer Ceramic for Bone Repair and Replacement – 45

BOOLEAN ALGEBRA

A Boolean Approach to Unbounded, Fully Symbolic Model Checking of Timed Automata – 257

BORIDES

Ultra-Hard Low Friction Coating Based on ALMGB14 for Reduced Wear on MEMS and Other Tribiological Components and System – 59

BORON ISOTOPES

Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 325

BOUNDARY LAYER SEPARATION

Three-Dimensional Computational Model for Flow in an Over-Expanded Nozzle With Porous Surfaces – 2

BOUNDARY LAYER TRANSITION

Discrete Roughness Transition for Hypersonic Flight Vehicles – 3

Fluorescence Visualization of Hypersonic Flow Past Triangular and Rectangular Boundary-layer Trips – 4

BOUNDARY LAYERS

Assessment of Turbulent Shock-Boundary Layer Interaction Computations Using the OVERFLOW Code – 101

Optimal Control of Shock Wave Turbulent Boundary Layer Interactions Using Micro-Array Actuation – 2

BOUNDARY VALUE PROBLEMS

Generalized Riccati Equations for Two-Point Boundary-Value Descriptor Systems – 231

Realization Theory for Deterministic Boundary-Value Descriptor Systems – 186

BRAIN

Analysis of fMRI Data by Blind Separation into Independent Spatial Components – 169

Cognitive and Emotive Empathy in Discourse: Towards an Integrated Theory of Mind – 221

PR01 - The Effects of Total Sleep Deprivation and Recovery Sleep on Cognitive Performance and Brain Function – 181

BRANCHING (PHYSICS)

Measurement of B Decays to PhiK-Gamma – 278

BRAZING

Projected Life of the SLAC Linac Braze Joints: Braze Integrity and Corrosion of Cooling Water Hardware on Accelerator Sections – 279

BREAKWATERS

Evaluating a Prefabricated Submerged Breakwater and Double-T Sill for Beach Erosion Prevention, Cape May Point, NJ – 147

BREAST

A Training Program in Breast Cancer Research Using NMR Techniques – 149

Antineoplastic Efficacy of Novel Polyamine Analogues in Human Breast Cancer – 165

Are Anti-Inflammatory Lymphocytes Able to Induce Remission of Breast Cancer – 150

Breast Cancer Prevention by Inducing Apoptosis in DCIS Using Breast Ductal Lavage – 167

Central Leptin Gene Therapy to Reduce Breast Cancer Risk Factors – 166

Computer-Aided Detection of Mammographic Masses in Dense Breast Images – 150

Dysregulation of RNA Interference in Breast Cancer – 167

Effect of Chimaerins, Novel Receptors for Phorbol Esters, on Breast Cancer Cell Proliferation and Cell Cycle Progression – 165

Estrogen-Induced Depurination of DNA: A Novel Target for Breast Cancer Prevention – 173

Gene Environment Interactions in Women With Breast and Secondary Lung Cancer – 150

HOXB7: An Oncogenic Gene in Breast Cancer – 153

Identification of the Downstream Promoter Targets of Smad Tumor Suppressors in Human Breast Cancer Cells – 160

Increasing Breast Cancer Surveillance Among African American Breast Cancer Survivors – 150

Miniature and Molecularly Specific Optical Screening Technologies for Breast Cancer – 161

Molecular Mechanism by Which Retinoids Prevent Breast Cancer Development – 154

Mouse Model of Human Breast Cancer Initiated by a Fusion Oncogene – 149

Neural Protein Synuclein (SNCG) in Breast Cancer Progression – 149

Novel Angiogenic Domains: Use in Identifying Unique Transforming and Tumor Promoting Pathways in Human Breast Cancer – 162

Nuclear Receptor Interactions in Breast Cancer: The Role of Kinase Signaling Pathways – 172

Optical Spectroscopy and Multiphoton Imaging for the Diagnosis and Characterization of Hyperplasias in the Mouse Mammary – 172

Prostate Derived Ets Factor, an Immunogenic Breast Cancer Antigen – 166

Randomized Trial of Neuroprotective Effects of Erythropoietin in Patients Receiving Adjuvant Chemotherapy for Breast Cancer: Position Emission Tomography and NE – 171

Rational Design of Regulators of Programmed Cell Death in Human Breast Cancer – 163

Role of the Neddylation Enzyme Uba3, A New Estrogen Receptor Corepressor in Breast Cancer – 154

Soy and Tamoxifen for Breast Cancer Prevention in High Risk Pre-Menopausal Women – 171

The Effect of a Home-Based Walking Intervention on Quality of Life, Body Composition, and Estrogen Metabolism in Postmenopausal Breast Cancer Survivors – 169

The Role of AhR in Breast Cancer Development – 166

The Role of CRELD1 Isoform 9b in the Pathogenesis of Breast Cancer – 150

Three Dimensional Reconstruction Algorithm for Imaging Pathophysiological Signals Within Breast Tissue Using Near Infrared Light – 154

BRIGHTNESS

Vertical Beam Size Control in TLS and TPS – 275

BRISTOL-SIDDELEY BS 53 ENGINE

Incorporation of Half-Cycle Theory Into Ko Aging Theory for Aerostructural Flight-Life Predictions – 122

BROADBAND

A Wide-Band Video Noise Source, 50 KC to 10 MC – 108

GRO J1655-40: Early Stages of the 2005 Outburst – 320

Radiation and Scattering Compact Antenna Laboratory – 97

BROADCASTING

A Comparison of Power-Efficient Broadcast Routing Algorithms – 132

A Near-Optimum Channel Access Protocol Based on Incremental Collision Resolution and Distributed Transmission Queues – 217

A Novel Power-Efficient Broadcast Routing Algorithm Exploiting Broadcast Efficiency – 132

Broadcast with Heterogeneous Node Capability – 88

Design Issues on Broadcast Routing Algorithms using Realistic Cost-Effective Smart Antenna Models – 237

Maximizing Static Network Lifetime of Wireless Broadcast Adhoc Networks – 131

Secure Broadcast in Energy-Aware Wireless Sensor Networks – 131

BROMIDES

Very Fast Doped LaBr(sup 3) Scintillators and Time-Of-Flight Pet – 266

BUBBLES

Analysis and Modeling of Surfzone Turbulence and Bubbles – 106

Parton Bubble Model for Two Particle Angular Correlations at RHIC/LHC – 261

BUDGETING

A Comparison of the Navy and the Air Force Budgeting and Execution Process for Aviation Fuel (AVFUEL) – 64

BUILDINGS

Building from the Bottom Up – 335

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Amendments to the Fire Protection and Life Safety Provisions of the New York City Building Code by Local Laws Adopted While World Trade Center 1, 2, and 7 Were in Use. NIST NCSTAR 1-1G – 121

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Analysis of Aircraft Impacts into the World Trade Center Towers. Appendix A. Still Images of the Video Records Used in Chapter 7 – 118

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Analysis of Published Accounts of the World Trade Center Evacuation. NIST NCSTAR 1-7A – 120

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of Building Code Structural Requirements. NIST NCSTAR 1-1B – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of Codes, Standards, and Practices in Use at the Time of the Design and Construction of World Trade Center 1, 2, and 7. NIST NCSTAR 1-1E – 118

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of the 1968 and Current (2003) New York City Building Code Provisions. NIST NCSTAR 1-1F – 118

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Contemporaneous Structural Steel Specifications. NIST NCSTAR 1-3A – 120

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. Appendices A-B – 300

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. Appendices A-G – 118

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. Appendices C-G – 300

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. NIST NCSTAR 1-1A. (Appendices not included) – 300

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design, Construction, and Maintenance of Structural and Life Safety Systems. NIST NCSTAR 1-1 – 299

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Documentation of the Fuel System for Emergency Power in World Trade Center 7. NIST NCSTAR 1-1J – 63

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Fire Protection and Life Safety Provisions Applied to the Design and Construction of WTC 1, 2, 7 and Post-Construction Provisions Applied After Occupancy. NIST NCSTAR 1-1D – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Maintenance and Modifications to Structural Systems. NIST NCSTAR 1-1C. (Appendices not included) – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Fires Prior to September 11, 2001. NIST NCSTAR 1-4A – 119

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety, and Structural Systems of World Trade Center 7. NIST NCSTAR 1-1I – 120

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety Systems of the World Trade Center Towers. NIST NCSTAR 1-1H – 121

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Technical Documentation for Survey Administration. Questionnaires, Interviews, and Focus Groups. NIST NCSTAR 1-7B – 119

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: The Emergency Response Operations. Appendices A-L – 119

National Register Assessment of the Broadmoor Neighborhood, New Orleans, Orleans Parish, Louisiana – 122

New Technologies for New and Existing Buildings Allowing for Energy Conservation – 127

Session 7: Energy Saving Performance Contracts: Forms and Financing Options. Overview of Activities Related to Energy Efficiency Improvement in Finland – 133

BUNDLES

Authentication Tests and the Structure of Bundles – 229

C++ (PROGRAMMING LANGUAGE)

Evaluating Co-Array Fortran and Unified Parallel C – 206

C (PROGRAMMING LANGUAGE)

ORA: Organization Risk Analyzer – 210

C-135 AIRCRAFT

Tanker-Force Structure: Recapitalization of the KC-135 – 15

CADMIUM SULFIDES
Spatial Position Control of CdS Nanoclusters using a Self-Assembled Diblock Copolymer Template – 62

CALCIUM ISOTOPES
Natural Calcium Isotopic Composition of Urine as a Marker of Bone Mineral Balance – 156

CALCIUM PHOSPHATES
Polymeric Bioresorbable Composites Containing an Amorphous Calcium Phosphate Polymer Ceramic for Bone Repair and Replacement – 46

CALCIUM
Development of Low Density CaMg-Al-Based Bulk Metallic Glasses (Preprint) – 55

CALCULUS OF VARIATIONS
Scaling Results for the Variational Approach to Edge Detection – 215

CALENDARS
A Personalized Calendar Assistant – 312

CALIBRATING
A Hypothetical Perspective on the Relative Contributions of Strategic and Adaptive Control Mechanisms in Plastic Recalibration of Locomotor Heading Direction – 155

Calibrated Probabilistic Forecasting at the Stateline Wind Energy Center: The Regime-Switching Space-Time (RST) Method – 147

Calibrated Probabilistic Forecasting Using Ensemble Model Output Statistics and Minimum CRPS Estimation – 241

Calibrated Probabilistic Mesoscale Weather Field Forecasting: The Geostatistical Output Perturbation (GOP) Method – 146

Development of the System for Determination of the Size-of-Source Effect – 75

Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 125

Registration without Correspondences – 227

Self-calibration on a Three-sampler Network Analyzer with Nonstandard Connectors – 212

Uncertainty of the Characteristic of the Size-of-Source Effect in Radiation Thermometers – 82

Using Bayesian Model Averaging to Calibrate Forecast Ensembles – 146

CANCER
A Phase I/II Study of Combination Neoadjuvant Hormone Therapy and Weekly OGX-011 Prior to Radical Prostatectomy in Patients with Localized Prostate Cancer – 153

A Training Program in Breast Cancer Research Using NMR Techniques – 149

Antineoplastic Efficacy of Novel Polyamine Analogues in Human Breast Cancer – 165

Are Anti-Inflammatory Lymphocytes Able to Induce Remission of Breast Cancer – 150

Breast Cancer Prevention by Inducing Apoptosis in DCIS Using Breast Ductal Lavage – 167

Central Leptin Gene Therapy to Reduce Breast Cancer Risk Factors – 166

Characterization of Genetic Modifiers of Estrogen-Induced Mammary Cancer – 154

Dietary Determinants of Prostate Cancer – 170

Dietary Heterocyclic Amines and Polymorphic Variants in the Etiology of Prostate Cancer – 159

Dysregulation of RNA Interference in Breast Cancer – 167

Effect of Chimaerins, Novel Receptors for Phorbol Esters, on Breast Cancer Cell Proliferation and Cell Cycle Progression – 165

Estrogen-Induced Depurination of DNA: A Novel Target for Breast Cancer Prevention – 173

Evaluating Shielding Effectiveness for Reducing Space Radiation Cancer Risks – 334

Facilitating Treatment Decision Making, Adjustment, and Coping in Men Newly Diagnosed with Prostate Cancer. Addendum – 164

Gene Environment Interactions in Women With Breast and Secondary Lung Cancer – 150

Glycopetide-Based Immunotherapy for Prophylaxis and Treatment of Mammary Adenocarcinomas – 149

HOXB7: An Oncogenic Gene in Breast Cancer – 153

Identification of the Downstream Promoter Targets of Smad Tumor Suppressors in Human Breast Cancer Cells – 160

Increasing Breast Cancer Surveillance Among African American Breast Cancer Survivors – 150

Inhibitory Ah Receptor-Androgen Receptor Crosstalk in Prostate Cancer – 170

Lysophosphatidic Acid Regulation and Roles in Human Prostate Cancer – 154

Miniature and Molecularly Specific Optical Screening Technologies for Breast Cancer – 161

Molecular Biology and Prevention of Endometrial Cancer – 170

Molecular Mechanism by Which Retinoids Prevent Breast Cancer Development – 154

Molecular Mechanisms of Prostate Cancer Progression – 171

Monitoring Cancer Oxygenation Changes Induced by Ultrasound – 150

Mouse Model of Human Breast Cancer Initiated by a Fusion Oncogene – 149

Naked DNA Immunization of Prevention of Prostate Cancer in a Dunning Rat Prostate Tumor Model – 172

Neural Protein Synuclein (SNCG) in Breast Cancer Progression – 149

Novel Angiogenic Domains: Use in Identifying Unique Transforming and Tumor Promoting Pathways in Human Breast Cancer – 162

Nuclear Imaging for Assessment of Prostate Cancer Gene Therapy – 158

Nuclear Receptor Interactions in Breast Cancer: The Role of Kinase Signaling Pathways – 172

Optical Spectroscopy and Multiphoton Imaging for the Diagnosis and Characterization of Hyperplasias in the Mouse Mammary – 172

Prostate Derived Ets Factor, an Immunogenic Breast Cancer Antigen – 166

Randomized Trial of Neuroprotective Effects of Erythropoietin in Patients Receiving Adjuvant Chemotherapy for Breast Cancer: Position Emission Tomography and NE – 171

Rational Design of Regulators of Programmed Cell Death in Human Breast Cancer – 163

Report Back from the NCI-Wide Workshop: Enhancing Interactions to Reduce Cancer Health Disparities. Held on July 17th, 2006 – 306

Role of the Neddylation Enzyme Uba3, A New Estrogen Receptor Corepressor in Breast Cancer – 154

Soy and Tamoxifen for Breast Cancer Prevention in High Risk Pre-Menopausal Women – 171

The Effect of a Home-Based Walking Intervention on Quality of Life, Body Composition, and Estrogen Metabolism in Postmenopausal Breast Cancer Survivors – 169

The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer – 157

The Role of AhR in Breast Cancer Development – 166

The Role of CRELD1 Isoform 9b in the Pathogenesis of Breast Cancer – 150

Using Genetically Engineered Mice to Probe the Role of Bioactive Lipids in Prostate Carcinogenesis – 157

CAPACITORS
High Energy Density Polymer Film Capacitors – 96

Radio Frequency Applications of Barium Strontium Titanate Thin Film Tunable Capacitors – 96

Soldier System Power Sources – 131

CARBON DIOXIDE

Leakage from Geologic Storage Reservoirs of CO2 – 137

Review of Hazardous Chemical Species Associated with CO2 Capture from Coal-Fired Power Plants and their Potential Fate during CO2 Geologic Storage – 136

Time-Lapse Seismic Modeling and Inversion Modeling and Inversion of CO2 Saturation for Sequestration and Enhanced Oil Recovery – 135

CARBON FIBERS

Electrothermal Desorption of CWA Simulants from Activated Carbon Cloth – 39

Macroscopic Fiber Comprising Single-Wall Carbon Nanotubes and Acrylonitrile-Based Polymer and Process for Making the Same – 46

CARBON NANOTUBES

Carbon Nanotube Based Light Sensor – 78

Carbon Nanotube Filter – 41

High Tensile Strength Carbon Nanotube Film and Process for Making the Same – 293

Macroscopic Fiber Comprising Single-Wall Carbon Nanotubes and Acrylonitrile-Based Polymer and Process for Making the Same – 46

Nanotube Composites and Methods for Producing – 46

Template-Growth of Highly Ordered Carbon Nanotube Arrays on Silicon POST-PRINT – 53

CARBONACEOUS CHONDRITES

A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 328

CARBON

Application of Carbon Based Nano-Materials to Aeronautics and Space Lubrication – 114

Carbon Materials Metal/Metal Oxide Nanoparticle Composite and Battery Anode Composed of the Same – 44

Composition Range and Glass Forming Ability of Ternary Ca-Mg-Cu Bulk Metallic Glasses (Preprint) – 55

CARCINOGENS

HOXB7: An Oncogenic Gene in Breast Cancer – 153

Using Genetically Engineered Mice to Probe the Role of Bioactive Lipids in Prostate Carcinogenesis – 157

CARGO

Analysis of a Gross Counting Decision Metric for Use in Threat Detection During Cargo Container Inspection – 269

CAROTENOIDS

Molecular Mechanism by Which Retinoids Prevent Breast Cancer Development – 154

CARRIAGES

Project Clinker, Hydraulic Carriage for Airship Installation of Optical Equipment – 16

CASSINI MISSION

Titan Orbiter with Aerorover Mission (TOAM) – 319

CATABOLISM

Evolution of Catabolic Pathways for Synthetic Compounds Bacterial Pathways for Degradation of 2,4-dinitrotoluene and Nitrobenzene – 164

CATALOGS (PUBLICATIONS)

Fast Access, Low Memory, Pair Catalog – 1

CATALYSTS

Molybdenum Disulfide as a Lubricant And Catalyst in Adaptive Nanocomposite Coatings (Preprint) – 53

CATHODES

Comparison Between H-Ion and Heat Cleaning of CU-Metal Cathodes – 269

CAVITATION FLOW

Effect of Strain-Path Reversal on Microstructure Evolution and Cavitation During Hot Torsion Testing of Ti-6A1-4V (Preprint) – 56

CAVITIES

High Precision SC Cavity Diagnostics with Hom Measurements – 266

Investigation of Hot-Spots as a Function of Material Removal in a Large-Grain Niobium Cavity – 258

Performances of High Purity Niobium Cavities with Different Grain Sizes – 258

Recent Developments in SRF Cavity Science and Performance – 273

CD-ROM

Toxic Substances Control Act (TSCA): ASCII Text Data, January 2007, PMN Number to EPA Accession Number Link (Raw Data on CD-ROM) – 42

CELL MEMBRANES (BIOLOGY)

Bucky Paper as a Support Membrane in Retinal Cell Transplantation – 149

Making Lipid Membranes Rough, Tough, and Ready to Hit the Road – 156

CELLS (BIOLOGY)

Effect of Chimaerins, Novel Receptors for Phorbol Esters, on Breast Cancer Cell Proliferation and Cell Cycle Progression – 165

Selectivity of Local Field Potentials in Macaque Inferior Temporal Cortex – 226

Spatial-Temporal Mapping of the T Cell Receptor NF-kappaB Signaling Pathway – 152

CERAMICS

Computational Design of UHTC Materials for Hypersonic Applications (Preprint) – 61

Phase Transformation of ‘Chem-prep’ PZT 95/5-2Nb HF 1035 Ceramic Under Quasi-static Loading Conditions – 60

Plutonium-238 Alpha-Decay Damage Study of the Ceramic Waste Form – 58

Polymeric Bioresorbable Composites Containing an Amorphous Calcium Phosphate Polymer Ceramic for Bone Repair and Replacement – 45

Solid Oxide Fuel Cell APU Feasibility Study for a Long Range Commercial Aircraft Using UTC ITAPS Approach – 22

Study of Self-Assembly Monolayers for Colloidal Processing of Ceramics and Textured, Super-Hydrophobic – 58

Ultra High Temperature Ceramics for Hypersonic Vehicle Applications – 58

CEREBRAL CORTEX

Realistic Modeling of Simple and Complex Cell Tuning in the HMAX Model, and Implications for Invariant Object Recognition in Cortex – 182

Selectivity of Local Field Potentials in Macaque Inferior Temporal Cortex – 226

CERENKOV COUNTERS

Proposal for an Experimental Program in Neutrino Physics and Proton Decay in the Homestake Laboratory – 275

CERIUM

Lu(sup 1)xI(sup 3):Ce(sup x): A Scintillator for Gamma Ray Spectroscopy and Time-Of Flight Pet – 266

Very Fast Doped LaBr(sup 3) Scintillators and Time-Of-Flight Pet – 266

CERTIFICATION

Certification of Completion of Level-2 Milestone 461: Deploy First Phase of I/O Infrastructure for Purple – 260

CH-47 HELICOPTER

Failure Analysis of a CH-47 Horizontal Hinge Pin Assembly, P/N 114RS226 – 14

CHAOS

Estimation and Detection with Chaotic Systems – 243

Spread Spectrum Modulation and Signal Masking Using Synchronized Chaotic Systems – 69

CHARACTERIZATION

Characterization of Materials with Optically Shaped Acoustic Waveforms – 272

Characterization of the Pep-II Colliding-Beam Phase Space by the Boost Method – 264

Communications System Based on Real-Time Neurophysiological Characterization – 70

Electro-Optical Characterization – 128

New Hyperspectral Discrimination Measure for Spectral Characterization – 228

Parabolic Trough VSHOT Optical Characterization in 2005-2006 – 129

Solid-Density Plasma Characterization with X-Ray Scattering on the 200-J Janus Laser – 271

CHARGE COUPLED DEVICES

CCD and PIN-CMOS Developments for Large Optical Telescope – 332

CHARGED PARTICLES

Radiation and Plasma Environments for Lunar Missions – 333

CHEMICAL ANALYSIS

Chemical Analyses of Water Samples From the Picher Mining Area, Northeast Oklahoma and Southeast Kansas – 38

Genesis Silicon Carbide Concentrator Target 60003 Preliminary Ellipsometry Mapping Results – 329

CHEMICAL DEFENSE

A Medical Research and Evaluation Facility (MREF) and Studies Supporting the Medical Chemical Defense Program – 167

CHEMICAL WARFARE

A Medical Research and Evaluation Facility (MREF) and Studies Supporting the Medical Chemical Defense Program – 167

CHEMOTHERAPY

Breast Cancer Prevention by Inducing Apoptosis in DCIS Using Breast Ductal Lavage – 168

Inhibitory Ah Receptor-Androgen Receptor Crosstalk in Prostate Cancer – 170

Molecular Biology and Prevention of Endometrial Cancer – 170

Randomized Trial of Neuroprotective Effects of Erythropoietin in Patients Receiving Adjuvant Chemotherapy for Breast Cancer: Position Emission Tomography and NE – 171

CHILE

Trichococcus Patagoniensis sp. nov., a Facultative Anaerobe that grows at -5 C, Isolated from Penguin Guano in Chilean Patagonia – 155

CHINA

Use of Stochastic Modeling of Stratigraphic Relationships in High Resolution Seismic Reflection Data for Prediction of the Distribution of Acoustic and Geotechnical Property Variability in Near Surface Sediments on the East China Sea Continental Margin – 127

CHLORIDES

Prophylactic Effects of Choline Chloride on Muscle Atrophy in Tail-suspended Rats – 177

CHOLINESTERASE

Silica-Immobilized Enzyme Reactors; Application to Cholinesterase-Inhibition Studies – 155

CHOLINE

Prophylactic Effects of Choline Chloride on Muscle Atrophy in Tail-suspended Rats – 177

CHROMIUM STEELS

Fracture Toughness and Strength in a New Class of Bainitic Chromium-Tungsten Steels – 46

CHROMIUM

Reduced Air Emissions for Hard Chrome Plating at the NADEP NAS North Island, San Diego Using an Alternative Emission Control Technology – 140

CHRONOLOGY

Ar-39-Ar-40 Ages of Two Nakhlites, MIL03346 and Y000593: A Detailed Analysis – 327

Sm-Nd Isotopic Systematics of Troctolite 76335 – 330

CIRCUITS

An Integrated Tool for High Speed Circuit Design Including Substrate Effects – 98

Application of Tactitron RCA Type 6441 to Pulse Circuitry – 97

Generating Efficient Layouts from Optimized MOS Circuit Schematics – 82

Macromodeling CMOS Circuits for Timing Simulation – 94

Some Issues in Distributed Asynchronous Routing in Virtual Circuit Data Networks – 190

CIRCULATION CONTROL AIRFOILS

Parametric Evaluation of Thin, Transonic Circulation-Control Airfoils – 3

CISLUNAR SPACE

Comparison of Fixed and Variable Time Step Trajectory Integration Methods for Cislunar Trajectories – 231

CITIES

Applying Perceptually Driven Cognitive Mapping to Virtual Urban Environments – 229

Passive Panoramic Image Fusion (PPIF) for 360 Degree Situational Awareness to Support Operations in Urban Terrain – 124

Study of Stability Conditions in an Urban Area – 139

CIVIL AVIATION

A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series – 10

Index to FAA Office of Aerospace Medicine Reports: 1961 through 2004 – 17

Next Generation Air Transportation System 2005 Progress Report – 7

Next Generation Air Transportation System Integrated Plan – 7

Review of Cranked-Arrow Wing Aerodynamics Project: Its International Aeronautical Community Role – 12

CIVIL DEFENSE

Defense Display Strategy and Roadmaps – 335

CLADDING

A Multi-Scale Modeling of Laser Cladding Process (Preprint) – 112

Fuel-Cladding Interaction Layers in Irradiated U-Zr and U-Pu Zr Fuel Elements – 40

CLASSIFICATIONS

A Wavelet Packet Approach to Transient Signal Classification – 284

Black Hole Spectral States and Physical Connections – 322

CLASSIFIERS

Named Entity Recognition as a House of Cards: Classifier Stacking – 235

Statistical Comparisons of Classifiers in Machine Learning – 79

CLAYS

Novel Anionic Clay Adsorbents for Boiler-Blow Down Waters Reclaim and Reuse. (Final Report, September 1, 2004-August 31, 2005) – 49

CLEANING

Comparison Between H-Ion and Heat Cleaning of CU-Metal Cathodes – 269

Decontamination of Genesis Array Materials by UV Ozone Cleaning – 329

CLEARANCES

Turbomachinery Clearance Control – 115

CLIMATE CHANGE

Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 125

Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences. Synthesis and Assessment Product 1.1 – 143

CLIMATE MODELS

Concurrent Single-Executable CCSM with MPH Library – 196

CLIMATE

Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions – 144

CLIMBING FLIGHT

Guidance and Control of an Autonomous Soaring UAV – 25

CLOSED ECOLOGICAL SYSTEMS

Development of a Complex Experimental System for Studies of Controlled Ecological Life Support Technique – 175

Development of Controlled Ecological Life-support System in Russia – 176

CLOTHING

ARN II Program, Final Technical Report – 218

Clothing Ventilation Estimates From Manikin Measurements – 184

Transient Sweat Rate Calculation from Humidity Measurements Under Clothing – 297

CLOUD PHYSICS

Model Calculations of Solar Spectral Irradiance in the 3.7 Micron Band for Earth Remote Sensing Applications – 141

CLOUDS (METEOROLOGY)

Global, Multi-Year Analysis of Clouds and Earth's Radiant Energy System Terra Observations and Radiative Transfer Calculations – 142

Validation of the Archived CERES Surface and Atmosphere Radiation Budget (SARB) at SGP – 142

CLOUD-TO-GROUND DISCHARGES

Objective Lightning Probability Forecasting for Kennedy Space Center and Cape Canaveral Air Force Station – 141

CLUSTER ANALYSIS

Bayesian Inference for Color Image Quantization via Model-Based Clustering Trees – 191

MCLUST: Software for Model-Based Clustering, Density Estimation and Discriminant Analysis – 206

Model-Based Clustering for Image Segmentation and Large Datasets Via Sampling – 189

CMOS

A Quantum Dot Optical Modulator for Integration With Si CMOS – 88

CCD and PIN-CMOS Developments for Large Optical Telescope – 332

Macromodeling CMOS Circuits for Timing Simulation – 94

COAL GASIFICATION

Review of Hazardous Chemical Species Associated with CO2 Capture from Coal-Fired Power Plants and their Potential Fate during CO2 Geologic Storage – 136

COAL

Review of Hazardous Chemical Species Associated with CO2 Capture from Coal-Fired Power Plants and their Potential Fate during CO2 Geologic Storage – 136

COANDA EFFECT

Parametric Evaluation of Thin, Transonic Circulation-Control Airfoils – 3

COASTAL WATER

Extending NASA Research Results to Benefit Society: Rapid Prototyping for Coastal Applications – 126

COATINGS

Characterization and Modeling of Bonded Piezoelectric Sensor Performance and Durability in Simulated Aircraft Environments (Preprint) – 17

Coatings and Biodegradable and Bioabsorbable Films – 169

Magnetization Losses in Multifilament Coated Superconductors (Postprint) – 280

COATING

Combustion Turbine (CT) Hot Section Coating Life Management. (Final Report) – 60

Ultra-Hard Low Friction Coating Based on ALMGB14 for Reduced Wear on MEMS and Other Tribiological Components and System – 59

COCKPITS

Advanced Distributed Simulation and the Fog-of-Simulation: Lessons Learned from the Cockpit – 14

Study on Modified Delphi Method as Used for Index Filtration in Ergonomic Evaluation of Cockpit Display – 176

CODING

LIFT - The LIsp Framework for Testing – 211

Numerical Methods for Analysis of Charged Vacancy Diffusion in Dielectric Solids – 95

Study of Attrition Documentation at the U.S. Navy Recruit Training Command – 310

COGNITION

Applying Perceptually Driven Cognitive Mapping to Virtual Urban Environments – 229

Evaluating a Computational Model of Social Causality and Responsibility – 254

Modeling Dynamic Perceptual Attention in Complex Virtual Environments – 200

PR01 - The Effects of Total Sleep Deprivation and Recovery Sleep on Cognitive Performance and Brain Function – 181

COHERENT RADIATION

Bunch Length Measurements at the JLab FEL Using Coherent Transition and Synchrotron Radiation – 295

COHESION

Simulation of Delamination Propagation in Composites Under High-Cycle Fatigue by Means of Cohesive-Zone Models – 122

COLLIMATORS

Direct Measurement of Geometric and Resistive Wakefields in Tapered Collimators for the International Linear Collider – 267

Wakefield Calculations for 3D Collimators – 295

Wakefields in the LCLS Undulator Transitions – 295

COLLISION AVOIDANCE

A Near-Optimum Channel Access Protocol Based on Incremental Collision Resolution and Distributed Transmission Queues – 217

Collision Avoidance and Resolution Multiple Access (CARMA) – 213

Collision Avoidance for Unmanned Aircraft: Proving the Safety Case – 6

Floor Acquisition Multiple Access with Collision Resolution – 216

Scalable Solutions for Interactive Virtual Humans that can Manipulate Objects – 202

Throughput and Fairness of Collision Avoidance Protocols in Ad Hoc Networks – 6

COLLISIONS

A Near-Optimum Channel Access Protocol Based on Incremental Collision Resolution and Distributed Transmission Queues – 217

Floor Acquisition Multiple Access with Collision Resolution – 216

Graphene Layer Growth: Collision of Migrating Five-Member Rings – 52

National Transportation Safety Board Aircraft Accident Report: Runway Overrun and Collision, Platinum Jet Management, LLC, Bombardier Challenger CL-600-1A11, N370V, Teterboro, New Jersey, on February 2, 2005 – 6

COLLOIDS

Control of the ST7 Disturbance Reduction System Flight Experiment – 34

Self-Assembled Colloidal Crystals for Photonic Applications and Its Outlook – 293

Study of Self-Assembly Monolayers for Colloidal Processing of Ceramics and Textured, Super-Hydrophobic – 58

COLOR

Bayesian Inference for Color Image Quantization via Model-Based Clustering Trees – 191

Coloured Petri Net Modelling of a Generic Avionics Mission Computer – 200

Determining the Number of Colors or Gray Levels in an Image Using Approximate Bayes Factors: The Pseudolikelihood Information Criterion (PLIC) – 245

COMBAT

A Review of Manned Thermal Garment Diving Studies With Lessons Learned for the SDV Operator and Combat Swimmer – 299

A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Algorithm for the Iterative Design of Observer Field Tests – 65

C-17A Special Operations Low Level II (SOLL II) Supporting the Combatant Commander – 13

Estimating the Training Effectiveness of Interactive Air Combat Simulation – 183

Human Emotional State and its Relevance for Military VR Training – 202

Preliminary Derivation of Test Item Clusters for Predicting Injuries, Poor Physical Performance, and Overall Attrition in Basic Combat Training – 253

Present and Future Diagnostics and Prognostics of Ground Combat Vehicles – 318

Robotic Follower Experimentation Results – 225

Techniques for Iterative Design of Observer Field Tests – 65

Techniques for the Statistical Analysis of Observer Data – 248

The Development of a Business Case Analysis for the Acquisition of the Agile Rapid Global Combat Support System Used for the USA Marine Corps' Ground Equipment – 66

Training Benefits of Interactive Air Combat Simulation – 183

COMBUSTION CHAMBERS

Combustion Turbine (CT) Hot Section Coating Life Management. (Final Report) – 60

COMBUSTION EFFICIENCY

The Art of Extracting One-Dimensional Flow Properties from Multi-Dimensional Data Sets – 24

COMBUSTION PHYSICS

Benchmark Experimental Database for Multiphase Combustion Model Input and Validation: A Users Follow-Up – 103

Fire Dynamics Simulation (Version 2): Technical Reference Guide – 103

Fire Dynamics Simulator (Version 3) User's Guide – 103

COMBUSTION PRODUCTS

Cost-Effective Reciprocating Engine Emissions Control and Monitoring for E&P Field and Gatherings Engines. Report 14. Technical Report, April 1, 2006-June 30, 2006 – 114

COMBUSTION

Benchmark Experimental Database for Multiphase Combustion Model Input and Validation: A Users Follow-Up – 103

Combustion Turbine (CT) Hot Section Coating Life Management. (Final Report) – 60

Evaluation of a New Liquid Fire-Extinguishing Agent for Combustible Metal Fires – 42

Graphene Layer Growth: Collision of Migrating Five-Member Rings – 52

Review of Hazardous Chemical Species Associated with CO2 Capture from Coal-Fired Power Plants and their Potential Fate during CO2 Geologic Storage – 136

COMMAND AND CONTROL

Distributed Decision and Communication Problems in Tactical USAF Command and Control – 69

Global Grid Architecture Concept – 303

Intrusion Reaction: Recommendations for Obtaining Reaction Capabilities – 215

MAFFS and Military Support to Civil Authority: A Case Study in Command and Control – 72

Near Space: Should Air Force Space Command Take Control of Its Shore? – 18

Risk Driven Outcome-Based Command and Control (C2) Assessment – 66

Using Human Systems Integration and Knowledge Engineering to Define and Design Anti-Terrorism/Force Protection Systems and Solutions – 183

COMMERCE

A Business Case Study of Open Source Software – 207

Constellation Stretch Goals: Review of Industry Inputs – 250

The Development of a Business Case Analysis for the Acquisition of the Agile Rapid Global Combat Support System Used for the USA Marine Corps' Ground Equipment – 66

COMMERCIAL AIRCRAFT

Constellation Stretch Goals: Review of Industry Inputs – 250

The Maintenance Costs of Aging Aircraft: Insights from Commercial Aviation – 27

COMMERCIAL OFF-THE-SHELF PRODUCTS

A Methodology for Improving the Shipyard Planning Process: Using KVA Analysis, Risk Simulation and Strategic Real Options – 100

State of the Art in Anomaly Detection and Reaction: An Update – 207

COMMUNICATION NETWORKS

A Set-Covering Approach for Modeling Attacks on Key Predistribution in Wireless Sensor Networks – 214

Cross-Layer Design and Optimization for Wireless Sensor Networks – 73

Cross-Layer Design for Energy-Efficient Secure Multicast Communications in Ad Hoc Networks – 132

Softswitch Architecture Remodelling for New Generation IP Multimedia Subsystem Environment – 79

Throughput and Fairness of Collision Avoidance Protocols in Ad Hoc Networks – 6

COMMUNICATION

Antigone: Implementing Policy in Secure Group Communication – 69

Distributed Decision and Communication Problems in Tactical USAF Command and Control – 69

Ismene: Provisioning and Policy Reconciliation in Secure Group Communication – 69

Motivations to Resolve Communication Dilemmas in Database-Mediated Collaboration – 69

Signal Processing and Communication with Solitons – 69

COMPATIBILITY

Sensor Networking Testbed with IEEE 1451 Compatibility and Network Performance Monitoring – 213

COMPENSATORS

Analysis of PMD Compensators With Fixed DGD Using Importance Sampling – 98

COMPLEMENTARY DNA

Robust Estimation of cDNA Microarray Intensities with Replicates – 245

COMPLEX SYSTEMS

CETIS: Complex Effluents Toxicity Information System. CETIS Retrieval System User's Manual – 306

CORES - Complex Organizational Reasoning System – 216

Development of a Complex Experimental System for Studies of Controlled Ecological Life Support Technique – 175

QLISP: A Language for the Interactive Development of Complex Systems – 204

COMPOSITE MATERIALS

Carbon Materials Metal/Metal Oxide Nanoparticle Composite and Battery Anode Composed of the Same – 44

Effect of Inclusion Morphology on the Coefficient of Thermal Expansion in Filled Epoxy Matrix (Preprint) – 47

Enhanced Pinning in YBCO Films with Bazro3 Nanoparticles – 293

Fracture Toughness and Strength in a New Class of Bainitic Chromium-Tungsten Steels – 46

Functionally Graded Shape Memory Alloy Composites Optimized for Passive Vibration Control – 45

Innovative Mechanism-Based Textile Composite Damage Modeling Basing on a Nonlinear Fiber Model and Enhanced Homogenization Method – 45

Magnetoelectric Multilayer Composites for Field Conversion – 91

Materials Development for Hypersonic Flight Vehicles – 45

Nanotube Composites and Methods for Producing – 46

COMPOSITE STRUCTURES

Probabilistic Design of Composite Structures – 45

COMPOSITION (PROPERTY)

Methods and Apparatuses for Producing Metallic Compositions via Reduction of Metal Halides – 55

COMPRESSION TESTS

Compression and Instrumented Indentation Measurements on Biomimetic Polymers – 40

COMPTON EFFECT

Inverse Compton Emission from Galactic Supernova Remnants: Effect of the Interstellar Radiation Field – 322

Inverse Compton Scattering on Solar Photons, Heliospheric Modulation, and Neutrino Astrophysics – 322

COMPUTATIONAL FLUID DYNAMICS

Application of Computational Fluid Dynamics to a Preliminary Extended Area Protection System (EAPS) Projectile – 102

Arcjet Semi-Elliptic Nozzle Simulations and Validation in Support of TPS Testing – 101

Assessment of Turbulent Shock-Boundary Layer Interaction Computations Using the OVERFLOW Code – 101

Development of Supersonic Combustion Experiments for CFD Modeling – 105

Fire Dynamics Simulation (Version 2): Technical Reference Guide – 103

Fire Dynamics Simulator (Version 3) User's Guide – 103

Heat Transfer and Fluid Dynamics Measurements in the Expansion Space of a Stirling Cycle Engine – 37

NASA/MSFC's Calculation for Test Case 1a of ATAC-FSDC Workshop on After-body and Nozzle Flows – 101

Optical Flow Computation via Multiscale Regularization – 98

Review of Cranked-Arrow Wing Aerodynamics Project: Its International Aeronautical Community Role – 12

Runtime and Pressurization Analyses of Propellant Tanks – 36

Statistical Analysis of CFD Solutions from the Third AIAA Drag Prediction Workshop – 243

USM3D Unstructured Grid Solutions for CAWAPI at NASA LaRC – 13

COMPUTATIONAL GEOMETRY

Computational Limitations of Model Based Recognition – 207

COMPUTATIONAL GRIDS

Grid Nesting with STWAVE – 189

COMPUTATION

Algorithms using Java for Spreadsheet Dependent Cell Recomputation – 240

Frontiers in Evolutionary Biology. Report of a Workshop – 195

COMPUTER AIDED DESIGN

Hierarchical Role-based Viewing for Multi-level Information Security in Collaborative CAD – 307

Principles of Fit to Optimize Helmet Sizing – 185

COMPUTER AIDED MAPPING

Real-Time High-Dynamic Range Texture Mapping – 199

COMPUTER AIDED TOMOGRAPHY

Phase Effects on Mesoscale Object X-ray Attenuation Radiographs – 259

COMPUTER ANIMATION

Scalable Solutions for Interactive Virtual Humans that can Manipulate Objects – 202

COMPUTER ASSISTED INSTRUCTION

Explainable Artificial Intelligence for Training and Tutoring – 220

Reflective Tutoring for Immersive Simulation – 220

COMPUTER GRAPHICS

A Media-Independent Content Language for Integrated Text and Graphics Generation – 193

Acquisition of Time-Varying Participating Media – 107

Distributive Interactive Simulation Network Interface for A-10 Simulator in Support of I/ITSEC '95 Conference Demonstrations – 205

Hierarchical Role-based Viewing for Multi-level Information Security in Collaborative CAD – 307

Mixing Story and Simulation in Interactive Narrative – 203

NoPumpG: Creating Interactive Graphics With Spreadsheet Machinery – 209

Scalable Solutions for Interactive Virtual Humans that can Manipulate Objects – 202

COMPUTER INFORMATION SECURITY

Authentication Tests and the Structure of Bundles – 229

Birds of a Feather: Supporting Secure Systems – 194

Fusion Center Guidelines: Developing and Sharing Information and Intelligence in a New Era – 303

How to Prevent Type-Flaw Guessing Attacks on Password Protocols – 215

Implementation-Oriented Secure Architectures – 214

Intrusion Reaction: Recommendations for Obtaining Reaction Capabilities – 215

COMPUTER NETWORKS

A Comparison of Power-Efficient Broadcast Routing Algorithms – 132

Certification of Completion of Level-2 Milestone 461: Deploy First Phase of I/O Infrastructure for Purple – 260

Cross-Layer Design for Energy-Efficient Secure Multicast Communications in Ad Hoc Networks – 132

Floor Acquisition Multiple Access with Collision Resolution – 216

How to Prevent Type-Flaw Guessing Attacks on Password Protocols – 215

Intrusion Detection System Requirements. A Capabilities Description in Terms of the Network Monitoring and Assessment Module of CSAP21 – 215

Intrusion Reaction: Recommendations for Obtaining Reaction Capabilities – 215

Maximizing Static Network Lifetime of Wireless Broadcast Adhoc Networks – 131

Network Centric Warfare – 213

Secure Broadcast in Energy-Aware Wireless Sensor Networks – 131

Self-calibration on a Three-sampler Network Analyzer with Nonstandard Connectors – 212

Semantic Web Rule Languages – 213

Sensor Networking Testbed with IEEE 1451 Compatibility and Network Performance Monitoring – 213

Some Issues in Distributed Asynchronous Routing in Virtual Circuit Data Networks – 190

State of the Art in Anomaly Detection and Reaction: An Update – 207

VP3: Using Vertex Path and Power Proximity for Energy Efficient Key Distribution – 131

COMPUTER PROGRAMMING

An Analysis of Earned Value Management Implementation Within the F-22 System Program Office's Software Development – 19

Analytical Design of Evolvable Software for High-Assurance Computing – 208

Electrotechnical Review, Volume 73, No. 5 – 78

E-LOTOS-Based Compositional Service-Based Synthesis of Multi-Party Time-Sharing-Based Protocols – 77

Emotionally Evocative Environments for Training – 212

The Case for an Open Data Model – 201

COMPUTER PROGRAMS

A Business Case Study of Open Source Software – 207

An Integrated High Resolution Hydrometeorological Modeling Testbed using LIS and WRF – 144

Collision Avoidance and Resolution Multiple Access (CARMA) – 213

Evaluation of the Modular Semi-Automated Force Air Entity Simulation – 11

IDA: An Intelligent Data Access Program – 222

MCLUST: Software for Model-Based Clustering, Density Estimation and Discriminant Analysis – 206

Monitored Execution of Robot Plans Produced by Strips – 221

Numerical Methods for Analysis of Charged Vacancy Diffusion in Dielectric Solids – 95

PNNL OS3700 Tritium Monitoring System Software and Hardware Operations Manual Rev. 0 – 197

Software Tool for Analysis of Variance of DNA Microarray Data – 163

Standardization of Object Oriented Extensions to Vector Signal and Image Processing Library (VSIPL) – 209

Statistical Methods and Software for the Analysis of Occupational Exposure Data with Non-Detectable Values – 242

USM3D Unstructured Grid Solutions for CAWAPI at NASA LaRC – 13

COMPUTER SECURITY

Security Guards for the Future Web – 214

COMPUTER STORAGE DEVICES

ARN II Program, Final Technical Report – 218

COMPUTER SYSTEMS PROGRAMS

Smart Register Files for High-Performance Microprocessors – 215

COMPUTER TECHNIQUES

Computer-Aided Detection of Mammographic Masses in Dense Breast Images – 150

Development of multi service provisioning platform in synchronous digital hierarchy systems – 199

Speech Synthesis by Rule: An Acoustic Domain Approach – 220

COMPUTER VISION

Biologically Plausible Neural Model for the Recognition of Biological Motion and Actions – 225

Differential Invariant Signatures and Flows in Computer Vision: A Symmetry Group Approach – 221

Geometric Variational Methods for Controlled Active Vision – 223

Learning and Recognition in Natural Environments – 227

Object-Centered Surface Reconstruction: Combining Multi-Image Stereo and Shading – 227

COMPUTERIZED SIMULATION

A Hypothetical Perspective on the Relative Contributions of Strategic and Adaptive Control Mechanisms in Plastic Recalibration of Locomotor Heading Direction – 155

Concurrent Single-Executable CCSM with MPH Library – 196

Cooling Force Measurement in CELSIUS – 274

Distributive Interactive Simulation Network Interface for A-10 Simulator in Support of I/ITSEC ‘95 Conference Demonstrations – 205

Dynamic Articulatory Model of Speech Production Using Computer Simulation – 69

Estimating the Training Effectiveness of Interactive Air Combat Simulation – 183

Evaluation of the Modular Semi-Automated Force Air Entity Simulation – 11

Joint Synthetic Battlespace Desert Pivot Experiment (JDPE) – 211

Mixing Story and Simulation in Interactive Narrative – 203

New Real-time Modeling and Simulation Products and Applications – 191

Particle Tracking and Simulation on the .NET Framework – 272

Scalable Solutions for Interactive Virtual Humans that can Manipulate Objects – 202

Simulation of Biomolecular Nanomechanical Systems – 160

Training Benefits of Interactive Air Combat Simulation – 183

User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 208

Using Computer Games to Train Information Warfare Teams – 208

COMPUTERS

Development of multi service provisioning platform in synchronous digital hierarchy systems – 199

Parallel Computer Implementation of Fast Low-Rank QR Approximation of the Biot-Savart Law – 188

PNNL OS3700 Tritium Monitoring System Software and Hardware Operations Manual Rev. 0 – 197

Survey of Codes and Algorithms Used in NERSC Material Science Allocations – 188

CONCENTRATION (COMPOSITION)

Concentration of Hydrogen Peroxide – 47

CONCENTRATORS

Genesis Silicon Carbide Concentrator Target 60003 Preliminary Ellipsometry Mapping Results – 329

CONCENTRICITY

Analysis Procedures for Double-Shell Target Concentricity and Wall Thickness – 271

CONCRETES

Seismic Measurement of Concrete Strength Properties – 27

CONDUCTORS

Physics and Fabrication of Quasi-One-Dimensional Conductors – 83

CONFERENCES

Annual Safar Symposium (3rd) Held at University of Pittsburgh School of Medicine on 23 June 2005 – 158

Conference Support - Surgery in Extreme Environments - Center for Surgical Innovation – 29

Distributive Interactive Simulation Network Interface for A-10 Simulator in Support of I/ITSEC ‘95 Conference Demonstrations – 205

Micromechanics and Microstructure Evolution: Modeling, Simulation and Experiments. Conference Held in Madrid, Spain, 12-16 Sep 2005 – 297

National Symposium on Recent Advances in Pollutant Monitoring of Ambient Air and Stationary Sources, Held at Raleigh, North Carolina May 3-6, 1983 – 138

Parton Orbital Angular Momentum – 262

Proceedings of the Oak Ridge Electron Linear Accelerator (ORELA) Workshop – 323

CONFIDENCE LIMITS

Measurement of the B+ Yields eta l+ nu and B+ Yields eta l+ nu Branching Fractions Using Upsilon(4S) yields B Bbar Event Tagged bu a Fully Reconstructed B Meson. The BABAR Collaboration – 267

CONFINEMENT

– 257

CONGESTION

Use of Weather Data to Predict Non-Recurring Traffic Congestion – 143

CONICAL SCANNING

A Deception Repeater for Conical-Scan Automatic Tracking Radars – 108

CONNECTORS

Self-calibration on a Three-sampler Network Analyzer with Nonstandard Connectors – 212

CONSISTENCY

Statistical Learning: Stability is Sufficient for Generalization and Necessary and Sufficient for Consistency of Empirical Risk Minimization – 256

CONSTRAINTS

Investigation of the Effects of Restraint Design Variations on Human Responses to Impact – 182

CONSTRUCTION MATERIALS

Building from the Bottom Up – 335

CONSTRUCTION

A Unified Construction of the Glushkov, Follow, and Antimirov Automata – 220

Advanced Quality Systems: Guidelines for Establishing and Maintaining Construction Quality Databases – 303

Construction, Geologic, and Water-Level Data for Observation Wells Near Brentwood, Williamson County, Tennessee – 124

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. Appendices A-B – 300

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. Appendices C-G – 300

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design, Construction, and Maintenance of Structural and Life Safety Systems. NIST NCSTAR 1-1 – 299

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Fire Protection and Life Safety Provisions Applied to the Design and Construction of WTC 1, 2, 7 and Post-Construction Provisions Applied After Occupancy. NIST NCSTAR 1-1D – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Fires Prior to September 11, 2001. NIST NCSTAR 1-4A – 119

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety, and Structural Systems of World Trade Center 7. NIST NCSTAR 1-1I – 120

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety Systems of the World Trade Center Towers. NIST NCSTAR 1-1H – 121

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 3: Multiple Plants at a Common Location. Report for January 20, 2005 to December 31, 2005 – 128

CONTAMINANTS

Comparison of Satellite Observations of Nitrogen Dioxide to Surface Monitor Nitrogen Dioxide Concentration – 135

Method and System for Treating Contaminants and Ordors in Airborne Emissions – 138

National Symposium on Recent Advances in Pollutant Monitoring of Ambient Air and Stationary Sources, Held at Raleigh, North Carolina May 3-6, 1983 – 138

CONTAMINATION

Adaptive Sampling and Analysis Programs (ASAPs) – 51

CONTEXT FREE LANGUAGES

Estimating Grammar Parameters using Bounded Memory – 239

Two Algorithms for Learning the Parameters of Stochastic Context-Free Grammars – 239

CONTRACT MANAGEMENT

ESPC Issues: DOE Super Energy Savings Performance Contracts – 134

CONTRACTION

sEMG Dynamics of Muscle Fatigue Induced by Maximal Voluntary Isometric Contractions – 176

CONTRACTORS

Effective Teamwork: The EVA NBL Experience – 299

Personal Identity Verification Demonstration Summary – 195

CONTRACTS

Using Public-Private Partnerships and Energy Savings Contracts to Fund DoD Mobile Assets – 317

CONTROL EQUIPMENT

Mobile Monolithic Polymer Elements for Flow Control in Microfluidic Devices – 102

CONTROL SURFACES

Method for Correcting Control Surface Angle Measurements in Single Viewpoint Photogrammetry – 12

CONTROL SYSTEMS DESIGN

Active Thermal Control System Development for Exploration – 328

Analysis, Estimation, and Control for Perturbed and Singular Systems and for Systems Subject to Discrete Events – 250

Control of the ST7 Disturbance Reduction System Flight Experiment – 34

Design of Autonomous Navigation Controllers for Unmanned Aerial Vehicles Using Multi-Objective Genetic Programming – 18

CONTROL THEORY

An Operator-Theoretic Approach to the Mixed-Sensitivity Minimization Problem – 236

Geometric Variational Methods for Controlled Active Vision – 223

Observability of Discrete Event Dynamic Systems. Revision – 183

Turbomachinery Clearance Control – 115

CONTROLLABILITY

Comanche Helmet-Mounted Display Heading-Tape Simulation – 20

Comanche Helmet-Mounted Display Symbology Simulation – 20

CONTROLLED ATMOSPHERES

Development of Controlled Ecological Life-support System in Russia – 176

CONTROLLERS

A Bearingless Switched-Reluctance Motor for High Specific Power Applications – 23

Crawler Control Strategies and Their Influence on Mine Finding Capabilities – 222

Metamaterial Scanning Lens Antenna Systems and Methods – 70

Robust Controller Design: Minimizing Peak-to-Peak Gain – 252

State Feedback l(sub 1)-Optimal Controllers can be Dynamic – 215

Towards Integrating AI Story Controllers and Game Engines: Reconciling World State Representations – 201

CONTROL

Aggregation and Multi-Level Control in Discrete Event Dynamic Systems – 194

Challenges to Control in Signal Processing and Communications – 84

CONVECTION CURRENTS

Guidance and Control of an Autonomous Soaring UAV – 25

CONVERGENT-DIVERGENT NOZZLES

Three-Dimensional Computational Model for Flow in an Over-Expanded Nozzle With Porous Surfaces – 2

CONVEXITY

Parametric Evaluation of Thin, Transonic Circulation-Control Airfoils – 3

CONVOLUTION INTEGRALS

Is Validity of the Convolution Theorem Questionable? – 78

COOLANTS

LFR Lead Cooled Fast Ractor – 270

Status of Physics and Safety Analyses for the Liquid Salt Cooled Very High Temperature Reactor (LS-VHTR) – 285

COOLERS

Material Optimization for Heterostructure Integrated Thermionic Coolers – 298

COOLING SYSTEMS

Importance of Cooling System Optimization with Regard to Lifetime and Reliability of Power Transformers – 76

Lamination Cooling System Formation Methods – 90

COOLING

Analysis of the Magnetized Friction Force – 262

Cooling Enhancement Using Inhomogeneous Thermoelectric Materials – 298

Cooling Force Measurement in CELSIUS – 274

Effect of Palm Cooling with Negative Pressure on Heat Balance During Exercise in a Hot, Dry Environment – 157

Experimental Studies of IBS in RHIC and Comparison with Theory – 262

Floating Refrigerant Loop Based on R-134a Refrigerant Cooling of High-Heat Flux Electronics – 85

High Field Solenoid Magnets for Muon Cooling – 261

Integrated Cooling for Optoelectronic Devices – 287

Muon Cooling RF R and D Program – 277

Projected Life of the SLAC Linac Braze Joints: Braze Integrity and Corrosion of Cooling Water Hardware on Accelerator Sections – 278

Summary of Beam Cooling and Intrabeam Scattering – 261

Trough Receiver Heat Loss Testing – 129

Use of a Spacer Vest to Increase Evaporative Cooling Under Military Body Armor – 297

COORDINATION

A Novel Group Coordination Protocol for Collaborative Multimedia Systems – 193

Locomotor Dysfunction after Spaceflight: Characterization and Countermeasure Development – 151

Toward a Multi-Robot Coordination Formalism – 224

COPOLYMERS

Spatial Position Control of CdS Nanoclusters using a Self-Assembled Diblock Copolymer Template – 62

COPPER OXIDES

Enhanced Pinning in YBCO Films with Bazro3 Nanoparticles – 294

COPPER

Composition Range and Glass Forming Ability of Ternary Ca-Mg-Cu Bulk Metallic Glasses (Preprint) – 55

Development of GRCop-84 for Rocket Engine Applications – 56

CORE SAMPLING

Titan Orbiter with Aerorover Mission (TOAM) – 319

CORES

CORES - Complex Organizational Reasoning System – 216

CORK (MATERIALS)

Laser Shearography Inspection of TPS (Thermal Protection System) Cork on RSRM (Reusable Solid Rocket Motors) – 116

CORRECTION

Method for Correcting Control Surface Angle Measurements in Single Viewpoint Photogrammetry – 12

Proof of Correctness of Proposed ATM Retransmission Scheme – 193

CORRELATION

A Canonical Correlations Approach to Multiscale Stochastic Realization – 193

Baryon-Strangness Correlations: A Diagnostic of Strongly Interacting Matter – 273

CORRIDORS

Evaluation and Integration of Texas Airports into the Trans-Texas Corridor, Project Summary – 8

Trans-Texas Corridor and the Texas Airport System: Opportunities and Challenges – 11

CORROSION PREVENTION

Corrosion Preventing Characteristics of Military Hydraulic Fluids. Part 2 – 57

CORROSION RESISTANCE

Comparative Corrosion Behavior of Two Palladium-Containing Titanium Alloys – 50

Methods to Calculate Corrosion Rates for Alloy 22 from Polarization Resistance Experiments – 49

CORROSION

Comparative Corrosion Behavior of Two Palladium-Containing Titanium Alloys – 50

Corrosion Preventing Characteristics of Military Hydraulic Fluids. Part 2 – 57

Effect of Solution Annealing on Alloy 22 Weld Properties – 54

Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository – 51

Methods to Calculate Corrosion Rates for Alloy 22 from Polarization Resistance Experiments – 49

Projected Life of the SLAC Linac Braze Joints: Braze Integrity and Corrosion of Cooling Water Hardware on Accelerator Sections – 278

COSMIC RAYS

First Results from IceCube – 323

COST ANALYSIS

Cost Valuation: A Model for Comparing Dissimilar Aircraft Platforms – 19

National Transportation Safety Board Aircraft Accident Report: Runway Overrun and Collision, Platinum Jet Management, LLC, Bombardier Challenger CL-600-1A11, N370V, Teterboro, New Jersey, on February 2, 2005 – 6

COST EFFECTIVENESS

Accelerating PV Cost Effectiveness Through Systems Design, Engineering, and Quality Assurance. Phase 1 Annual Technical Report, November 4, 2004-November 3, 2005 – 130

Autonomous Aerobraking Using Thermal Response Surface Analysis – 34

Cost-Effective Reciprocating Engine Emissions Control and Monitoring for E&P Field and Gatherings Engines. Report 14. Technical Report, April 1, 2006-June 30, 2006 – 114

Defense Infrastructure: Continuing Challenges in Managing DOD Lodging Programs as Army Moves to Privatize Its Program – 122

Design Issues on Broadcast Routing Algorithms using Realistic Cost-Effective Smart Antenna Models – 237

Energy Savings Assessment Methodology - Cost Effective Ways of Establishing the Action Plan – 123

Parallel Algorithms for the Assignment and Minimum-Cost Flow Problems – 252

COST ESTIMATES

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 1: Preferred Plant Size. Report for January 20, 2005 to December 31, 2005 – 129

COST REDUCTION

Lean Six Sigma for Reduced Cycle Costs and Improved Readiness – 317

COSTS

Constellation Stretch Goals: Review of Industry Inputs – 250

Cost Valuation: A Model for Comparing Dissimilar Aircraft Platforms – 18

Cost-Effective Reciprocating Engine Emissions Control and Monitoring for E&P Field and Gatherings Engines. Report 14. Technical Report, April 1, 2006-June 30, 2006 – 114

Information Warfare Arms Control: Risks and Costs – 316

The Maintenance Costs of Aging Aircraft: Insights from Commercial Aviation – 27

COUNTERMEASURES

Anti-HMGB1 Antibodies and Alpha-7 Agonists as Experimental Therapeutics as BW Countermeasures – 153

The National Biodefense Analysis and Countermeasures Center: Issues for Congress – 152

The Passive Countermeasures Program at the Naval Research Laboratory – 335

COUNTING

Analysis of a Gross Counting Decision Metric for Use in Threat Detection During Cargo Container Inspection – 269

CP VIOLATION

New Developments in Measurements of CP Violation – 275

CRACK INITIATION

Different Precursor Populations Revealed by Microsciouc Studies of Bulk Damage in KDP and DKDP Crystals – 43

Summary of Recent Damage-Initiation Experiments on KDP Crystals – 291

CRACK PROPAGATION

Crack Growth and Stress Intensity Prediction Techniques. Delivery Order 0027-1: Mixed Mode Failure Criteria – 281

Incorporation of Half-Cycle Theory Into Ko Aging Theory for Aerostructural Flight-Life Predictions – 121

Simulation of Delamination Propagation in Composites Under High-Cycle Fatigue by Means of Cohesive-Zone Models – 122

CRACKING (FRACTURING)

Bone Geometry as a Predictor of Tissue Fragility and Stress Fracture Risk – 151

CRACKS

Performance Comparison of Hot Rubber Crack Sealants to Emulsified Asphalt Crack Sealants – 42

CREEP PROPERTIES

Development of GRCop-84 for Rocket Engine Applications – 56

CREW EXPLORATION VEHICLE

Crew Exploration Vehicle Ascent Abort Coverage Analysis – 31

NASA CEV On-Orbit GN&C Analysis – 35

NASA CEV Reference Entry GN&C System and Analysis – 21

NASA CEV Reference GN&C Architecture – 21

CRIME

Developments in the National Incident-Based Reporting System (NIBRS) (Updated July 2006) – 304

CRITERIA

Determining the Number of Colors or Gray Levels in an Image Using Approximate Bayes Factors: The Pseudolikelihood Information Criterion (PLIC) – 245

CROSS CORRELATION

A HF Pulsed Transmitter for an Experimental Cross-Correlation Radar System – 108

CROSS FLOW

Aerodynamic Analysis of Body-Strake Configurations – 5

CROSSINGS

Comparison of 2 mrad and 14/20 mrad Crossing Angle Extraction Lines – 296

CROSSTALK

Inhibitory Ah Receptor-Androgen Receptor Crosstalk in Prostate Cancer – 171

CRUDE OIL

Elastomer Impact When Switch-Loading Synthetic Fuel Blends and Petroleum Fuels – 63

CRYOGENIC FLUIDS

Fiber Optic Raman Sensor to Monitor Concentration Ratio of Nitrogen and Oxygen in a Cryogenic Mixture – 286

CRYOGENICS

Effect of Inclusion Morphology on the Coefficient of Thermal Expansion in Filled Epoxy Matrix (Preprint) – 47

Novel Chamber Design for an In-Vacuum Cryo-Cooled Mini-Gap Undulator – 274

SNS Cryogenic Systems Commissioning – 295

CRYPTOGRAPHY

Authentication Tests and the Structure of Bundles – 229

How to Prevent Type-Flaw Guessing Attacks on Password Protocols – 215

Protocol Independence through Disjoint Encryption – 212

CRYSTALLINITY

Dynamical Study of Guest-Host Orientational Interaction in Liquid Crystalline Materials – 51

CRYSTALLOGRAPHY

Adaptive Bayesian Signal Reconstruction with A Priori Model Implementation and Synthetic Examples for X-Ray Crystallography – 242

CRYSTALS

Different Precursor Populations Revealed by Microsciouc Studies of Bulk Damage in KDP and DKDP Crystals – 43

Gallium Nitride Crystals and Wafers and Method of Making – 264

High-Throughput Methods for Determining Electron Density Distributions and Structures of Crystals – 42

Multi Dimensional Investigation of Laser Conditioning in KDP and DKDP Crystals – 290

Self-Assembled Colloidal Crystals for Photonic Applications and Its Outlook – 293

Summary of Recent Damage-Initiation Experiments on KDP Crystals – 291

System Considerations of a Wide-Open, Crystal-Video, Two-Channel Direction Finder – 68

CULTURAL RESOURCES

Phase I Cultural Resources Survey and Archeological Inventory of a Proposed 1.12 ha (2.87 ac) Borrow Pit and an Associated Access Road, Ascension Parish, Louisiana – 127

CURRENT REGULATORS

Step Current Inductive Antenna for Pulse Inductive Metal Detector – 91

CURVE FITTING

Techniques for the Statistical Analysis of Observer Data – 248

CURVES

On the Onsager-Machlup Functional of Diffusion Processes Around Non C2 Curves – 254

CYCLES

Lean Six Sigma for Reduced Cycle Costs and Improved Readiness – 317

Review of Hazardous Chemical Species Associated with CO2 Capture from Coal-Fired Power Plants and their Potential Fate during CO2 Geologic Storage – 136

CYCLIC COMPOUNDS

Randomized Trial of Neuroprotective Effects of Erythropoietin in Patients Receiving Adjuvant Chemotherapy for Breast Cancer: Position Emission Tomography and NE – 171

CYCLOTRON RESONANCE DEVICES

Low-Voltage Infrared Free-Electron Lasers Based on Gyrotron-Powered RF Wigglers – 111

DAMAGE ASSESSMENT

Method and System for Identifying Damage to a Wire – 93

Methods and Systems for Detecting and Locating Damage in a Wire – 92

DAMAGE

Different Precursor Populations Revealed by Microsciouc Studies of Bulk Damage in KDP and DKDP Crystals – 43

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Amendments to the Fire Protection and Life Safety Provisions of the New York City Building Code by Local Laws Adopted While World Trade Center 1, 2, and 7 Were in Use. NIST NCSTAR 1-1G – 121

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Analysis of Aircraft Impacts into the World Trade Center Towers. Appendix A. Still Images of the Video Records Used in Chapter 7 – 118

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Analysis of Published Accounts of the World Trade Center Evacuation. NIST NCSTAR 1-7A – 120

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of Building Code Structural Requirements. NIST NCSTAR 1-1B – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of Codes, Standards, and Practices in Use at the Time of the Design and Construction of World Trade Center 1, 2, and 7. NIST NCSTAR 1-1E – 118

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of the 1968 and Current (2003) New York City Building Code Provisions. NIST NCSTAR 1-1F – 118

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Contemporaneous Structural Steel Specifications. NIST NCSTAR 1-3A – 120

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. Appendices A-B – 300

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. Appendices A-G – 118

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. Appendices C-G – 300

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. NIST NCSTAR 1-1A. (Appendices not included) – 300

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design, Construction, and Maintenance of Structural and Life Safety Systems. NIST NCSTAR 1-1 – 299

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Documentation of the Fuel System for Emergency Power in World Trade Center 7. NIST NCSTAR 1-1J – 63

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Fire Protection and Life Safety Provisions Applied to the Design and Construction of WTC 1, 2, 7 and Post-Construction Provisions Applied After Occupancy. NIST NCSTAR 1-1D – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Maintenance and Modifications to Structural Systems. NIST NCSTAR 1-1C. (Appendices not included) – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Fires Prior to September 11, 2001. NIST NCSTAR 1-4A – 119

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety, and Structural Systems of World Trade Center 7. NIST NCSTAR 1-1I – 120

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety Systems of the World Trade Center Towers. NIST NCSTAR 1-1H – 121

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Technical Documentation for Survey Administration. Questionnaires, Interviews, and Focus Groups. NIST NCSTAR 1-7B – 119

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: The Emergency Response Operations. Appendices A-L – 119

Innovative Mechanism-Based Textile Composite Damage Modeling Basing on a Nonlinear Fiber Model and Enhanced Homogenization Method – 45

Method and System for Identifying Damage to a Wire – 92

Methods and Systems for Detecting and Locating Damage in a Wire – 92

Plutonium-238 Alpha-Decay Damage Study of the Ceramic Waste Form – 58

Simulation of Delamination Propagation in Composites Under High-Cycle Fatigue by Means of Cohesive-Zone Models – 122

DAMPING

Direct Space Charge Effects on the ILC Damping Rings: Task Force Report – 281

Intrabeam Scattering in the NLC Main Damping Rings – 270

Ion Effects in the Electron Damping Ring of the International Linear Collider – 295

JLAB Ampere-Clast Cryomodule Conceptual Design – 260

Perfect Electrode to Suppress Secondary Electrons Inside the Magnets – 278

Space Charge and Equilibrium Emittances in Damping Rings – 273

DATA ACQUISITION

Experiments in Evaluating Interactive Spoken Language Systems – 316

Jefferson Lab's Distributed Data Acquisition – 296

DATA BASE MANAGEMENT SYSTEMS

A Storage System for Scalable Knowledge Representation – 310

HDF5-Fast Query: An API for Simplifying Access to Data Storage, Retrieval, Indexing and Querying – 302

DATA BASES

A Storage System for Scalable Knowledge Representation – 310

A Team User's Guide – 314

Advanced Quality Systems: Guidelines for Establishing and Maintaining Construction Quality Databases – 303

Benchmark Experimental Database for Multiphase Combustion Model Input and Validation: A Users Follow-Up – 103

Development of Air Traffic Control Measurement Database – 7

Model-Based Clustering for Image Segmentation and Large Datasets Via Sampling – 189

Motivations to Resolve Communication Dilemmas in Database-Mediated Collaboration – 69

Nuclear Reaction and Structure Databases of the National Nuclear Data Center – 323

Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics – 161

Risk Management and Medical Liability: A Manual for Indian Health Service and Tribal Health Care Professionals. Second Edition – 304

Tariff Analysis Project: A Database and Analysis Platform for Electrictiy Tariffs – 306

The Database as Model: A Metatheoretic Approach – 314

The Rate of Progress in Natural Language Processing – 316

DATA COMPRESSION

JPEG 2000 and WSQ Image Compression Interoperability – 186

Subdue: Compression-Based Frequent Pattern Discovery in Graph Data – 302

DATA LINKS

Dual Use of Commercial Avionics Data Links for the U.S. Air Force – 73

DATA MANAGEMENT

A Storage System for Scalable Knowledge Representation – 310

Development of a Data Management Tool for Investigating Multivariate Space and Free Will Experiences in Virtual Reality – 201

High Performance Visualization using Query-Driven Visualization and Analytics – 188

Query-Driven Network Flow Data Analysis and Visualization. Final Report – 187

Scientific Data Management Center – 190

Sensor to User - NASA/EOS Data for Coastal Zone Management Applications Developed from Integrated Analyses: Verification, Validation and Benchmark Report – 125

Strategic Plan: 2000-2005 – 309

The Case for an Open Data Model – 201

DATA MINING

Iterative Structure Discovery in Graph-Based Data – 250

Tri-Plots: Scalable Tools for Multidimensional Data Mining – 308

DATA PROCESSING

Exploiting Secondary Sources for Unsupervised Record Linkage – 307

IDA: An Intelligent Data Access Program – 222

Incremental Model-Based Clustering for Large Datasets With Small Clusters – 254

Modeling Stock Order Flows and Learning Market-Making from Data – 204

On the Design of Information-Processing and Decisionmaking Organizations – 251

Tasks, Domains, and Languages – 308

The Rate of Progress in Natural Language Processing – 316

When is an Embedded MT System 'Good Enough' for Filtering? – 308

DATA PRODUCTS
Sensor to User - NASA/EOS Data for Coastal Zone Management Applications Developed from Integrated Analyses: Verification, Validation and Benchmark Report – 126

DATA SMOOTHING
Parallel Smoothing Algorithms for Casual and Acausal Systems – 232

DATA STORAGE
ARN II Program, Final Technical Report – 218

HDF5-Fast Query: An API for Simplifying Access to Data Storage, Retrieval, Indexing and Querying – 302

DATA SYSTEMS
Development of multi service provisioning platform in synchronous digital hierarchy systems – 199

Motion-Based Visualization, Part One – 197

Motion-Based Visualization, Part Two – 196

Postsecondary Institutions in the USA: Fall 2005 and Degrees and Other Awards Conferred: 2004-05. First Look – 304

Simulation Activities Using Gateway and Tactical Digital Information Links – 73

DATA TRANSMISSION
Cross-Layer Design for Energy-Efficient Secure Multicast Communications in Ad Hoc Networks – 132

Secure Broadcast in Energy-Aware Wireless Sensor Networks – 131

VP3: Using Vertex Path and Power Proximity for Energy Efficient Key Distribution – 131

DEBRIS
Dynamics of the DAZd Disks – 321

DECEPTION
A Deception Repeater for Conical-Scan Automatic Tracking Radars – 108

Two Chapters of Technical Report: Unmanned Military Vehicles - Human Factors of Augmenting the Force Chapter 1: Introduction Chapter 8: Summary: Issues and Conclusions – 185

DECISION MAKING
A Personalized Calendar Assistant – 312

Distributed Decision and Communication Problems in Tactical USAF Command and Control – 69

Facilitating Treatment Decision Making, Adjustment, and Coping in Men Newly Diagnosed with Prostate Cancer. Addendum – 164

Modeling the Interacting Decision Maker with Bounded Rationality – 251

On the Design of Information-Processing and Decisionmaking Organizations – 251

DECISION SUPPORT SYSTEMS
Risk-Based Decision Support of Water Resource Management Alternatives – 251

DECISION THEORY
Modeling the Interacting Decision Maker with Bounded Rationality – 251

DECODING
A Parallel Line Detection Algorithm Based on HMM Decoding – 193

Fast Decoding and Optimal Decoding for Machine Translation – 239

DECOMPOSITION
Conditions for Scale-Based Decompositions in Singularly Perturbed Systems – 240

On the Relation of Anticipative Stratonovich and Symmetric Integrals: A Decomposition Formula – 189

Quantum Gate Decomposition Algorithms – 268

DECONTAMINATION
Decontamination of Genesis Array Materials by UV Ozone Cleaning – 329

DEFECTS
Different Precursor Populations Revealed by Microsciouc Studies of Bulk Damage in KDP and DKDP Crystals – 43

How to Prevent Type-Flaw Guessing Attacks on Password Protocols – 215

Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

DEFENSE PROGRAM
A Medical Research and Evaluation Facility (MREF) and Studies Supporting the Medical Chemical Defense Program – 167

Distributed Decision and Communication Problems in Tactical USAF Command and Control – 69

Report of the Defense Science Board Task Force on Nuclear Capabilities Report Summary – 286

Robotic Follower Experimentation Results – 221

The Development of a Logistical Body of Knowledge for the Department of Defense – 313

DEFORMABLE MIRRORS
MEMS Actuated Deformable Mirror – 260

DEFORMATION
Lensing Signals in the Hubble Ultra-Deep Field Using All 2nd-Order Shape Deformations – 321

MEMS Actuated Deformable Mirror – 259

Structures Including Network and Topology for Identifying, Locating and Quantifying Physical Phenomena – 39

DEGRADATION
Evolution of Catabolic Pathways for Synthetic Compounds Bacterial Pathways for Degradation of 2,4-dinitrotoluene and Nitrobenzene – 164

Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 164

DEGREES OF FREEDOM
Designing a Self-Stabilizing Robot for Dynamic Mobile Manipulation – 225

DEHYDRATION
Theoretical Considerations Governing the Dehydration of Fuels by Gas Blowing – 44

DEICING
Investigations of Performance of Pneumatic Deicing Boots, Surface Ice Detectors, and Scaling of Intercycle Ice – 3

DELAMINATING
Simulation of Delamination Propagation in Composites Under High-Cycle Fatigue by Means of Cohesive-Zone Models – 122

DELAY
A Low-Sidelobe Partially Overlapped Constrained Feed Network for Time-Delayed Subarrays – 99

DELPHI METHOD (FORECASTING)
Study on Modified Delphi Method as Used for Index Filtration in Ergonomic Evaluation of Cockpit Display – 176

DEMAGNETIZATION
Interior Permanent Magnet Reluctance Machine with Brushless Field Excitation – 85

DENSITY DISTRIBUTION
High-Throughput Methods for Determining Electron Density Distributions and Structures of Crystals – 42

DENSITY MEASUREMENT
Exercise and Bone Density: Meta-Analysis – 151

DENSITY
MCLUST: Software for Model-Based Clustering, Density Estimation and Discriminant Analysis – 206

DEOXYRIBONUCLEIC ACID
DNA Precursor Metabolism and Mitochondrial Genome Stability – 173

Enhancing the Immunogenicity of a Dengue-2 DNA Vaccine with Adjuvants and Anti-Fc(gamma)RI Antibodies – 163

Estrogen-Induced Depurination of DNA: A Novel Target for Breast Cancer Prevention – 173

Naked DNA Immunization of Prevention of Prostate Cancer in a Dunning Rat Prostate Tumor Model – 172

Software Tool for Analysis of Variance of DNA Microarray Data – 163

DEPLETION

Rb-Sr and Sm-Nd Isotopic Studies of Martian Depleted Shergottes SaU 094/005 – 327

DEPLOYMENT

Information Feasability: Using the Concept for Planning the Information Needs of Deploying Forces – 312

DEPOSITION

Concept for Lightweight Spaced-Based Deposition Technology – 28

Effect of O2 Partial Pressure on YBa2Cu3O7-delta Thin Film Growth by Pulsed Laser Deposition – 54

Enhancing Bone Accretion Using Short Duration, Low-Level Mechanical Vibrations – 154

Size Selection Initiation Model Extended to Include Shape and Random Factors – 197

DEPTH

Defense in Depth: Foundation for Secure and Resilient IT Enterprises – 218

Speed and Accuracy in Shallow and Deep Stochastic Parsing – 241

DESCENT TRAJECTORIES

Powered Descent Trajectory Guidance and Some Considerations for Human Lunar Landing – 331

DESERTS

Joint Synthetic Battlespace Desert Pivot Experiment (JDPE) – 211

DESIGN ANALYSIS

Aerodynamic Analysis of Body-Strake Configurations – 5

Algorithm for the Iterative Design of Observer Field Tests – 65

Overview of Engineering Design and Analysis at the NASA John C. Stennis Space Center – 22

Probabilistic Design of Composite Structures – 45

SABER Optical Design – 264

The Art of Extracting One-Dimensional Flow Properties from Multi-Dimensional Data Sets – 24

Virtual Design and Testing of Materials: A Multiscale Approach – 40

DESIGN OPTIMIZATION

Cross-Layer Design and Optimization for Wireless Sensor Networks – 73

DETACHMENT

Process Improvement at the Aircraft Intermediate Maintenance Detachment (AIMD) at Naval Air Station Whidbey Island – 5

DETECTION

A Comparison of Mamdani and Sugeno Methods for Modeling Visual Perception Lab Data – 252

A Parallel Line Detection Algorithm Based on HMM Decoding – 193

Algorithm for the Iterative Design of Observer Field Tests – 65

Computer-Aided Detection of Mammographic Masses in Dense Breast Images – 150

Design of Error Detection Scheme for Class C Service in ATM – 337

Estimation and Detection with Chaotic Systems – 243

Fiber Optic Detection of Action Potentials in Axons – 287

High Sensitivity Array-Based Detection System – 94

Intrusion Detection for Air Force Networks: Environment Forecast – 67

Intrusion Detection for Air Force Networks: Operational, Performance, and Implementation Goals – 67

Laser-Based Spectroscopic Detection Techniques – 288

Methods and Systems for Detecting and Locating Damage in a Wire – 92

Natural Fiber Spin Reflectometer Providing a Virtual Differential Signal Sensing Array Capability – 289

Optimally Robust Redundancy Relations for Failure Detection in Uncertain Systems – 216

Role of Estrogen Metabolism in the Initiation of Prostate Cancer: Biomarkers of Susceptibility and Early Detection – 153

Simulation of Biomolecular Nanomechanical Systems – 160

State of the Art in Anomaly Detection and Reaction – 124

Target Detection in Multispectral Images using the Spectral Co-Occurrence Matrix and Entropy Thresholding – 284

Techniques for the Statistical Analysis of Observer Data – 248

Turbulence and Mountain Wave Conditions Observed with an Airborne 2-Micron Lidar – 19

DETECTORS

Simulation of Biomolecular Nanomechanical Systems – 160

DETERMINANTS

Dietary Determinants of Prostate Cancer – 170

DETONATION

Pulse Detonation Physiochemical and Exhaust Relaxation Processes – 24

DEUTERIUM FLUORIDES

An Inductively Coupled Goniometer for Wide-Aperture DF Arrays – 286

Positionering av Radiosaendare i Svar Radionmiljoe (Radio DF in Difficult Environment) – 68

DEUTERONS

Local Duality in Spin Structure Functions g1(p) and g1(d) – 278

Spin Structure Functions: Proton/Deuteron Measurements in the Resonance Region – 276

DEVIATION

Large Deviations and Applications: The Finite Dimensional Case – 189

DIABETES MELLITUS

Implementation of the Diabetes Practice Guideline in the Army Medical Department: Final Evaluation – 156

DIAGNOSIS

High Precision SC Cavity Diagnostics with Hom Measurements – 266

Optical Spectroscopy and Multiphoton Imaging for the Diagnosis and Characterization of Hyperplasias in the Mouse Mammary – 172

DIELECTRICS

Gratings for High Energy Petawatt Lasers – 279

Numerical Methods for Analysis of Charged Vacancy Diffusion in Dielectric Solids – 95

Radio-Frequency Driven Dielectric Heaters for Non-Nuclear Testing in Nuclear Core Development – 285

DIESEL ENGINES

An Introduction to Heavy-Duty Diesel Engine Frictional Losses and Lubricant Properties Affecting Fuel Economy - Part 1 – 65

DIETS

Dietary Determinants of Prostate Cancer – 170

Dietary Heterocyclic Amines and Polymorphic Variants in the Etiology of Prostate Cancer – 159

DIFFERENTIAL EQUATIONS

Analysis of Continuous Switching Systems: Theory and Examples – 254

Dissociated Dipoles: Image Representation via Non-local Comparisons – 255

DIFFRACTION

Semiconductor 1.7 W Volume Bragg Laser with Divergence Close to a Diffraction Limit – 111

Transverse Imaging of the Proton in Exclusive Diffractive PP Scattering – 279

DIFFUSION

High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems – 57

Numerical Methods for Analysis of Charged Vacancy Diffusion in Dielectric Solids – 95

On the Onsager-Machlup Functional of Diffusion Processes Around Non C2 Curves – 254

DIGITAL CAMERAS

Target/Background Polarization Profiles Using a COTS Digital Camera – 108

DIGITAL DATA

Simulation Activities Using Gateway and Tactical Digital Information Links – 73

DIGITAL ELECTRONICS

Procedural Layout of a High-Speed Floating-Point Arithmetic Unit – 94

DIGITAL SIMULATION

Power System Dynamic Security Assessment using Digital Simulation – 77

DIGITAL SYSTEMS

Active Learning Using Arbitrary Binary Valued Queries – 187

Analysis of Continuous Switching Systems: Theory and Examples – 254

Development of multi service provisioning platform in synchronous digital hierarchy systems – 199

Dual Use of Commercial Avionics Data Links for the U.S. Air Force – 73

Simulation Activities Using Gateway and Tactical Digital Information Links – 73

DIGITAL TECHNIQUES

Digital Nulling Pulse Inductive Metal Detector – 91

DIMENSIONAL ANALYSIS

Three-Dimensional Computational Model for Flow in an Over-Expanded Nozzle With Porous Surfaces – 2

DIOXIDES

Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

DIRECT CURRENT

Fractional-Slot Surface Mounted PM Motors with Concentrated Windings for HEV Traction Drives – 85

Layer by Layer Reconstruction Methods for the Earth Resistivity from Direct Current Measurements – 236

DIRECTIONAL ANTENNAS

Medium Access Control in Ad Hoc Networks With Omni-Directional and Directional Antennas – 67

DIRECTIONAL CONTROL

Tailored Excitation for Frequency Response Measurement Applied to the X-43A Flight Vehicle – 25

DISASTERS

Technical Basis Document for Natural Event Hazards – 136

DISCOVERY (ORBITER)

STS-114 Micrometeoroid/Orbital Debris (MMOD) Post-Flight Assessment – 330

DISCRETE FUNCTIONS

Aggregation and Multi-Level Control in Discrete Event Dynamic Systems – 194

Output Stabilizability of Discrete Event Dynamic Systems – 194

DISCRETIZATION (MATHEMATICS)

Some Issues at Sampled-Data Identification and Conversion of the Identified Models into the Continuous-Time Domain – 75

DISCRIMINANT ANALYSIS (STATISTICS)

MCLUST: Software for Model-Based Clustering, Density Estimation and Discriminant Analysis – 206

DISEASES

In-vivo Imaging of the Photoreceptor Mosaic in Retinal Dystrophies and Correlation with Visual Function – 291

MiTPA for Real Users, Real Data, Real Problems – 307

Nuclear Imaging for Assessment of Prostate Cancer Gene Therapy – 158

The Oligodendrocyte Progenitor Response to Demyelination – 151

DISPERSING

Ultra Low Volume Dispersal of Insecticides by Ground Equipment – 40

DISPLACEMENT

Lensing Signals in the Hubble Ultra-Deep Field Using All 2nd-Order Shape Deformations – 321

DISPLAY DEVICES

A Ground Vehicle Simulation Design to Study Driver Display Concepts – 64

A Unified Taxonomic Approach to the Laboratory Assessment of Visionic Devices – 184

Architecture for Rendering Graphics on Output Devices Over Diverse Connections – 305

Complexity and Automation Displays of Air Traffic Control: Literature Review and Analysis – 11

Intelligent Weather Agent – 112

Motion-Based Visualization, Part One – 197

Motion-Based Visualization, Part Two – 196

Study on Modified Delphi Method as Used for Index Filtration in Ergonomic Evaluation of Cockpit Display – 176

Video Summarization by Curve Simplification – 234

DISTANCE

Possibilities and Limitations of Electric Power Transmission Over Long Distances Part 2 - Long distance AC transmission – 78

Possibilities and Limitations of Electric Power Transmission Over Long Distances – 80

DISTRIBUTED MEMORY

Hemingway, A Distributed Shared Memory System – 192

DISTRIBUTED PARAMETER SYSTEMS

A Distributed and Iterative Method for Square Root Filtering in Space-Time Estimation – 191

DISTRIBUTED PROCESSING

E-LOTOS-Based Compositional Service-Based Synthesis of Multi-Party Time-Sharing-Based Protocols – 77

Some Issues in Distributed Asynchronous Routing in Virtual Circuit Data Networks – 190

DISTRIBUTION (PROPERTY)

Use of Stochastic Modeling of Stratigraphic Relationships in High Resolution Seismic Reflection Data for Prediction of the Distribution of Acoustic and Geotechnical Property Variability in Near Surface Sediments on the East China Sea Continental Margin – 127

DISTRICT OF COLUMBIA

Analysis of Wintertime Winds in Washington, D.C – 141

DIVERGENCE

Semiconductor 1.7 W Volume Bragg Laser with Divergence Close to a Diffraction Limit – 111

DIVING (UNDERWATER)

A Review of Manned Thermal Garment Diving Studies With Lessons Learned for the SDV Operator and Combat Swimmer – 299

DOCUMENT MARKUP LANGUAGES

XML-Native Constraint Evaluation – 253

DOCUMENTS

Workshop for Open Source Universal Picture Archiving and Communication Systems (PACS) – 110

DOMAINS

Tasks, Domains, and Languages – 308

Toward the Use of an Upper Ontology for U.S. Government and U.S. Military Domains: An Evaluation – 336

DOPED CRYSTALS

Very Fast Doped LaBr(sup 3) Scintillators and Time-Of-Flight Pet – 266

DOSAGE

Effects of Irradiation with Different Dose Rates of X-ray on Mouse Immune System – 177

DOSIMETERS

The Role of Dosimetry in High-Quality EMI Risk Assessment – 140

DRAG

Statistical Analysis of CFD Solutions from the Third AIAA Drag Prediction Workshop – 244

DRAINAGE

Drainage Areas of Streams at Selected Locations in Kentucky – 124

Drainage-Area Data for Wisconsin Streams – 123

Unsteady Storm Drainage Modeling Within the U.S. Army Corps of Engineers GSSHA Model – 106

DRONE VEHICLES

A Summary of Unmanned Aircraft Accident/Incident Data: Human Factors Implications – 10

Design of Autonomous Navigation Controllers for Unmanned Aerial Vehicles Using Multi-Objective Genetic Programming – 18

DRUGS

Molecular Biology and Prevention of Endometrial Cancer – 170

Randomized Trial of Neuroprotective Effects of Erythropoietin in Patients Receiving Adjuvant Chemotherapy for Breast Cancer: Position Emission Tomography and NE – 171

DRY HEAT

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 2: Comparison of Wet and Dry Rankine Cycle Heat Rejection. Report for January 20, 2005 to December 31, 2005 – 128

DUCTED FANS

Rotating Rake Mode Measurements Over Passive Treatment in a Ducted Fan – 283

DUCTILITY

Crack Growth and Stress Intensity Prediction Techniques. Delivery Order 0027-1: Mixed Mode Failure Criteria – 281

DUCTS

Resistance of HEPA Filters in a Ventilation Duct on Leakpath Factor Calcuations – 137

DURABILITY

Characterization and Modeling of Bonded Piezoelectric Sensor Performance and Durability in Simulated Aircraft Environments (Preprint) – 17

DWARF STARS

Dynamics of the DAZd Disks – 321

DYES

Development of High Efficiency, Low-Cost Flexible Dye-Sensitized Solar Cells – 84

DYNAMIC CHARACTERISTICS

Aggregation and Multi-Level Control in Discrete Event Dynamic Systems – 194

Dynamic Preload as an Impact Protection Concept – 266

The ROSSI X-Ray Timing Explorer: Capabilities, Achievements and Aims – 325

DYNAMIC CONTROL

Feedback Linearized Aircraft Control Using Dynamic Cell Structure – 25

Observability of Discrete Event Dynamic Systems. Revision – 183

DYNAMIC LOADS

Loads Induced in the Lumbar Spine of Seated Restrained Humans by Sideward (+Gy) Impact – 181

Mass Properties and Inertial Loading Effects of Head Encumbering Devices – 181

DYNAMIC MODELS

A Dynamic/Anisotropic Low Earth Orbit (LEO) Ionizing Radiation Model – 334

Dynamic Articulatory Model of Speech Production Using Computer Simulation – 69

Fitting APD Restitution with Artificial Neural Network – 174

DYNAMIC RANGE

An Autonomous Glider Network for the Monterey Bay Predictive Skill Experiment / AOSN-II – 10

Real-Time High-Dynamic Range Texture Mapping – 199

DYNAMIC RESPONSE

Effects of Head Mounted Devices on Head-Neck Dynamic Response to +GZ Accelerations – 181

Loads Induced in the Lumbar Spine of Seated Restrained Humans by Sideward (+Gy) Impact – 181

DYNAMIC STABILITY

Output Stabilizability of Discrete Event Dynamic Systems – 194

DYNAMICAL SYSTEMS

Nonlinear Dynamical Systems – 196

Output Stabilizability of Discrete Event Dynamic Systems – 235

State Feedback l(sub 1)-Optimal Controllers can be Dynamic – 215

DYNAMICS

Dynamics of the DAZd Disks – 321

EAR PROTECTORS

The Effect of Microphone Placement on Localization Accuracy with Electronic Pass-Through Earplugs – 284

EARTH ATMOSPHERE

An Integrated High Resolution Hydrometeorological Modeling Testbed using LIS and WRF – 145

Global, Multi-Year Analysis of Clouds and Earth's Radiant Energy System Terra Observations and Radiative Transfer Calculations – 142

Mesospheric Dynamical Changes Induced by the Solar Proton Events in October-November 2003 – 145

EARTH (PLANET)

Not So Rare Earth? New Developments in Understanding the Origin of the Earth and Moon – 125

EARTH RADIATION BUDGET

Validation of the Archived CERES Surface and Atmosphere Radiation Budget (SARB) at SGP – 142

EARTH SCIENCES

Comparison of Satellite Observations of Nitrogen Dioxide to Surface Monitor Nitrogen Dioxide Concentration – 135

Origin and Evolution of Deep Plasmaspheric Notches – 326

EARTH SURFACE

An Integrated High Resolution Hydrometeorological Modeling Testbed using LIS and WRF – 145

Validation of the Archived CERES Surface and Atmosphere Radiation Budget (SARB) at SGP – 142

EARTH-MOON SYSTEM

Not So Rare Earth? New Developments in Understanding the Origin of the Earth and Moon – 125

ECLIPSES

Five Millennium Canon of Solar Eclipses: -1999 to +3000 (2000 BCE to 3000 CE) – 320

ECOLOGY

Ecology, Environmental Research at Argonne National Laboratory, 1955-1985 – 303

ECONOMICS

Workshop Introduction - Building Energy Performance Improvement Through Advanced Technologies, Smart Organization, and Financing – 134

ECOSYSTEMS

Development of a Complex Experimental System for Studies of Controlled Ecological Life Support Technique – 175

Frontiers in Evolutionary Biology. Report of a Workshop – 195

EDGE DETECTION

Scaling Results for the Variational Approach to Edge Detection – 215

EDUCATION

A Biological Model of Object Recognition with Feature Learning – 222

A Hierarchical Algorithm for Neural Training and Control. Revision – 236

A Training Program in Breast Cancer Research Using NMR Techniques – 149

Active Learning Using Arbitrary Binary Valued Queries – 187

Byblos Speech Recognition Benchmark Results – 226

Digital Learning Network Education Events of NASA's Extreme Environments Mission Operations – 331

Emotionally Evocative Environments for Training – 212

Estimating the Training Effectiveness of Interactive Air Combat Simulation – 183

Explainable Artificial Intelligence for Training and Tutoring – 220

Human Emotional State and its Relevance for Military VR Training – 202

Joint Synthetic Battlespace Desert Pivot Experiment (JDPE) – 211

Lymphedema Prophylaxis Utilizing Perioperative Education – 159

PAC Learning with Generalized Samples and an Application to Stochastic Geometry – 187

People Recognition in Image Sequences by Supervised Learning – 286

Postsecondary Institutions in the USA: Fall 2005 and Degrees and Other Awards Conferred: 2004-05. First Look – 304

Preliminary Derivation of Test Item Clusters for Predicting Injuries, Poor Physical Performance, and Overall Attrition in Basic Combat Training – 253

Rapid Match Training for Large Vocabularies – 313

Rudimentary Force Feedback for Safe Guarded Teleoperation of Unmanned Vehicles: A Simulations and Training Approach – 223

Sensor to User - NASA/EOS Data for Coastal Zone Management Applications Developed from Integrated Analyses: Verification, Validation and Benchmark Report – 125

STRATA: Observer-based Measurement Agent Research Support – 64

Study of Attrition Documentation at the U.S. Navy Recruit Training Command – 310

Training Benefits of Interactive Air Combat Simulation – 183

Training Tree Transducers – 230

Using Computer Games to Train Information Warfare Teams – 208

EFFLUENTS

CETIS: Complex Effluents Toxicity Information System. CETIS Retrieval System User's Manual – 306

EIGENVECTORS

Diagonal Representation of Certain Matrices – 233

EJECTION

Minimizing the Sequenced Delay Time for Escape From High-Speed Low-Level Flight Profiles – 9

ELASTIC PROPERTIES

Study of Nonlinear Oscillations of Elastic Membrane – 265

ELASTIC SCATTERING

Transverse Imaging of the Proton in Exclusive Diffractive PP Scattering – 279

ELASTOMERS

Elastomer Impact When Switch-Loading Synthetic Fuel Blends and Petroleum Fuels – 63

ELECTRIC BATTERIES

Soldier System Power Sources – 131

Thermally-Related Safety Issues Associated with Thermal Batteries – 130

ELECTRIC CONNECTORS

Series Connected Buck-Boost Regulator – 87

ELECTRIC CONTACTS

Methods for Forming Small-Volume Electrical Contacts and Material Manipulations with Fluidic Microchannels – 104

ELECTRIC FIELDS

Control of Electric Field Domain Formation in Multiquantum Well Structures – 281

Do Capacitively Coupled Electric Fields Accelerate Tibial Stress Fracture Healing – 86

Magnetoelectric Multilayer Composites for Field Conversion – 91

Quantum Interference Effect and Electric Field Domain Formation in Quantum Well Infrared Photodetectors – 109

The Effect of Temperature on the Resonant Tunneling and Electric Field Domain Formation in Multiple Quantum Well Superlattices – 296

ELECTRIC GENERATORS

Energy Assessment Strategy and Energy Concepts for Industrial Facilities – 135

Real Time Flux Control in PM Motors – 84

ELECTRIC MOTOR VEHICLES

Case Study: Ebus Hybrid Electric Buses and Trolleys – 113

Evaluation of Utility System Impacts and Benefits of Optimally Dispatched Plug-In Hybrid Electric Vehicles – 82

Integrated Inverter for Driving Multiple Electric Machines – 89

Real Time Flux Control in PM Motors – 84

ELECTRIC MOTORS

A Bearingless Switched-Reluctance Motor for High Specific Power Applications – 23

Lamination Cooling System Formation Methods – 90

Simplified Hybrid Secondary Uncluttered Machine and Method – 88

ELECTRIC NETWORKS

Analysis of Industrial Power Networks – 80

Graph-based Representations and Coupled Verification of VLSI Schematics and Layouts – 95

ELECTRIC POTENTIAL

Voltage-Controlled Tunable GaAs/AlGaAs Multistack Quantum Well Infrared Detector – 108

ELECTRIC POWER PLANTS

Energy Assessment Strategy and Energy Concepts for Industrial Facilities – 135

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 1: Preferred Plant Size. Report for January 20, 2005 to December 31, 2005 – 129

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 3: Multiple Plants at a Common Location. Report for January 20, 2005 to December 31, 2005 – 128

ELECTRIC POWER TRANSMISSION

Electrotechnical Review, Volume 73, No.4 – 75

Possibilities and Limitations of Electric Power Transmission Over Long Distances Part 2 - Long distance AC transmission – 78

Possibilities and Limitations of Electric Power Transmission Over Long Distances – 80

The Flores Mixed Integer Linear Programming Model for the Optimal Response of Hydro Cascades in the Electricity Spot Market – 81

ELECTRIC POWER

Analysis of Industrial Power Networks – 80

Importance of Cooling System Optimization with Regard to Lifetime and Reliability of Power Transformers – 76

ELECTRIC PROPULSION

The USAF Electric Propulsion Research Program (Postprint) – 88

ELECTRICAL ENGINEERING

Electronic Device and Process for Forming Same – 90

Electrotechnical Review, Volume 73, No. 5 – 78

Electrotechnical Review, Volume 73, No.4 – 75

Possibilities and Limitations of Electric Power Transmission Over Long Distances Part 2 - Long distance AC transmission – 78

Possibilities and Limitations of Electric Power Transmission Over Long Distances – 80

Series Connected Buck-Boost Regulator – 87

ELECTRICAL INSULATION

Importance of Cooling System Optimization with Regard to Lifetime and Reliability of Power Transformers – 76

Methods and Systems for Testing Wire Insulation – 92

ELECTRICAL RESISTIVITY

Layer by Layer Reconstruction Methods for the Earth Resistivity from Direct Current Measurements – 236

Material Optimization for Heterostructure Integrated Thermionic Coolers – 298

ELECTRICITY

Analysis of Flicker Levels in the Slovenian Transmission Network – 82

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 2: Comparison of Wet and Dry Rankine Cycle Heat Rejection. Report for January 20, 2005 to December 31, 2005 – 128

Power System Dynamic Security Assessment using Digital Simulation – 76

Tariff Analysis Project: A Database and Analysis Platform for Electrictiy Tariffs – 306

The Scientific Program of the U.S. Naval Research Laboratory – 322

ELECTROACOUSTIC TRANSDUCERS

Performance, Thermal, and Vibration Qualification Testing of Zetec Acoustic Transducers, Model Z0002659-2, Sondicator Probes – 282

ELECTROCARDIOGRAPHY

Research on ECG Denoising during Spaceflight – 177

ELECTRODES

Electron Transfer Reactivity Patterns at Chemically Modified Electrodes: Fundamentals and Application to the Optimization of Redox Recycling Amplification Systems – 49

Perfect Electrode to Suppress Secondary Electrons Inside the Magnets – 278

ELECTRODYNAMICS

Electrodynamic Tether – 33

ELECTROLYSIS

Alkaline Electrolysis. Final Technical Report – 53

ELECTROMAGNETIC FIELDS

An Optimization of Pulsed ElectroMagnetic Fields Study – 156

The Role of Dosimetry in High-Quality EMI Risk Assessment – 140

ELECTROMAGNETIC INTERFERENCE

Digital Nulling Pulse Inductive Metal Detector – 91

EM Threat Analysis for Wireless Systems – 71

ELECTROMOTIVE FORCES

Real Time Flux Control in PM Motors – 84

ELECTROMYOGRAPHY

sEMG Dynamics of Muscle Fatigue Induced by Maximal Voluntary Isometric Contractions – 176

ELECTRON ACCELERATORS

Proceedings of the Oak Ridge Electron Linear Accelerator (ORELA) Workshop – 324

ELECTRON BEAMS

Electron Beam Freeform Fabrication in the Space Environment – 319

Jefferson Lab's Distributed Data Acquisition – 296

Studies of E-Cloud Build up the the FNAL Main Injector and for the LHC – 265

ELECTRON BUNCHING

Wakefields in the LCLS Undulator Transitions – 295

ELECTRON CLOUDS

New Simulation Capabilities of Electron Clouds in Ion Beams with Large Tune Depression – 280

Studies of E-Cloud Build up the the FNAL Main Injector and for the LHC – 265

ELECTRON DENSITY (CONCENTRATION)

High-Throughput Methods for Determining Electron Density Distributions and Structures of Crystals – 42

ELECTRON GUNS

Pressure Model for the Vacuum System for the Electron Gun and Injector for LCLS Final Design Report – 272

ELECTRON MICROSCOPES

Tem Mems Device Holder and Method of Fabrication – 93

ELECTRON MICROSCOPY

Nature of the Distinctive Microscopic Features in R5(SIxGe1-x)4 Magnetic Refrigeration Materials – 39

ELECTRON SCATTERING

Inverse Compton Scattering on Solar Photons, Heliospheric Modulation, and Neutrino Astrophysics – 323

ELECTRON SPIN

Local Duality in Spin Structure Functions g1(p) and g1(d) – 278

ELECTRON TRANSFER

Electron Transfer Reactivity Patterns at Chemically Modified Electrodes: Fundamentals and Application to the Optimization of Redox Recycling Amplification Systems – 49

ELECTRON TRANSITIONS

Direct Measurement of Population-Induced Broadening of Quantum Well Intersubband Transitions – 284

ELECTRONIC EQUIPMENT

Electronic Device and Process for Forming Same – 90

ELECTRONIC STRUCTURE

Efficient Execution of Electronic Structure Calculations on SMP Clusters – 48

Rare-earth Transition-Metal Intermetallics: Structure-Bonding-Property Relationships – 48

ELECTRONIC WARFARE

Network Centric Warfare – 213

ELECTRONS

Perfect Electrode to Suppress Secondary Electrons Inside the Magnets – 278

ELECTRO-OPTICS

Electro-Optical Characterization – 128

E-MRS Spring Meeting - Nanophotonic Materials Session – 97

ELECTROPLATING

Reduced Air Emissions for Hard Chrome Plating at the NADEP NAS North Island, San Diego Using an Alternative Emission Control Technology – 140

ELLIPSOMETRY

Genesis Silicon Carbide Concentrator Target 60003 Preliminary Ellipsometry Mapping Results – 329

ELLIPTICAL GALAXIES

Luminosity Function of Faint Globular Clusters in M87 – 324

EMBEDDING

A Comparison of Power-Efficient Broadcast Routing Algorithms – 132

Evaluating Social Causality and Responsibility Models: An Initial Report – 222

EMBRYOS

Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity – 178

EMERGENCIES

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Documentation of the Fuel System for Emergency Power in World Trade Center 7. NIST NCSTAR 1-1J – 63

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: The Emergency Response Operations. Appendices A-L – 119

EMITTANCE

Space Charge and Equilibrium Emittances in Damping Rings – 274

EMOTIONAL FACTORS

Human Emotional State and its Relevance for Military VR Training – 202

The Fidelity of 'Feel': Emotional Affordance in Virtual Environments – 203

EMOTIONS

Evaluating a Computational Model of Emotion – 233

Human Emotional State and its Relevance for Military VR Training – 202

The Fidelity of 'Feel': Emotional Affordance in Virtual Environments – 203

EMPLOYEE RELATIONS

Effective Teamwork: The EVA NBL Experience – 299

END-TO-END DATA SYSTEMS

Scientific Data Management Center – 190

ENERGETIC PARTICLES

Radiation and Plasma Environments for Lunar Missions – 333

ENERGY ABSORPTION

Energy Absorber for Vehicle Occupant Safety and Survivability – 184

ENERGY CONSERVATION

A Comparison of Power-Efficient Broadcast Routing Algorithms – 132

A Novel Power-Efficient Broadcast Routing Algorithm Exploiting Broadcast Efficiency – 132

Cross-Layer Design for Energy-Efficient Secure Multicast Communications in Ad Hoc Networks – 132

Energy and Utilities Readiness for the Army Industrial Activities – 133

Energy Savings Assessment Methodology - Cost Effective Ways of Establishing the Action Plan – 123

Energy Savings with a Scalable Source Capture Ventilation – 140

ESPC Issues: DOE Super Energy Savings Performance Contracts – 134

Maximizing Static Network Lifetime of Wireless Broadcast Adhoc Networks – 131

Navy Energy/Water Program and Applicable Process Technologies – 133

New Technologies for New and Existing Buildings Allowing for Energy Conservation – 127

Secure Broadcast in Energy-Aware Wireless Sensor Networks – 131

Session 7: Energy Saving Performance Contracts: Forms and Financing Options. Overview of Activities Related to Energy Efficiency Improvement in Finland – 133

Using Public-Private Partnerships and Energy Savings Contracts to Fund DoD Mobile Assets – 317

VP3: Using Vertex Path and Power Proximity for Energy Efficient Key Distribution – 131

Workshop Introduction - Building Energy Performance Improvement Through Advanced Technologies, Smart Organization, and Financing – 134

ENERGY CONSUMPTION

ESPC Issues: DOE Super Energy Savings Performance Contracts – 134

Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions – 143

Workshop Introduction - Building Energy Performance Improvement Through Advanced Technologies, Smart Organization, and Financing – 134

ENERGY CONVERSION

Solid-State and Vacuum Thermionic Energy Conversion – 135

ENERGY DISSIPATION

How Does Collisionless Magnetic Reconnection Work in the Presence of a Guide Magnetic Field? – 94

ENERGY GAPS (SOLID STATE)

Improved Temperature Characteristics in Quantum Dot Lasers with Indirect-Bandgap Barriers – 97

Performance Improvement in Quantum Well Lasers by Optimizing Band Gap Offset at Quantum Well Heterojunctions – 111

Wide-Bandgap Semiconductors – 85

ENERGY POLICY

ESPC Issues: DOE Super Energy Savings Performance Contracts – 134

ENERGY TECHNOLOGY

Re-Evaluating Satellite Solar Power Systems for Earth – 130

ENERGY TRANSFER

Graphene Layer Growth: Collision of Migrating Five-Member Rings – 52

ENGINE TESTS

Overview of Engineering Design and Analysis at the NASA John C. Stennis Space Center – 22

Spark Ignition Aircraft Engine Endurance Test of Aviation-Grade Ethanol 85 – 37

Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel – 26

ENGINEERS

Unsteady Storm Drainage Modeling Within the U.S. Army Corps of Engineers GSSHA Model – 106

ENHANCED VISION

Flight Display Integration – 26

ENRICHMENT

Evaluating Social Causality and Responsibility Models: An Initial Report – 222

ENTROPY

Energy Sustainability – 263

Target Detection in Multispectral Images using the Spectral Co-Occurrence Matrix and Entropy Thresholding – 284

ENTRY GUIDANCE (STS)

NASA CEV Reference Entry GN&C System and Analysis – 21

ENVIRONMENTAL LABORATORIES

Ecology, Environmental Research at Argonne National Laboratory, 1955-1985 – 303

ENVIRONMENTAL MONITORING

Northwest Forest Plan-The First 10 Years (1994-2003): Synthesis of Monitoring and Research Results – 136

Passive Badge Assessment for Long-Term, Low-Level Air Monitoring on Submarines: VOC Badge Validation – 44

ENVIRONMENTAL QUALITY

Arizona Department of Environmental Quality: Air Quality Annual Report, 2005 – 139

ENVIRONMENTAL SURVEYS

Environmental Support to Space Launch – 30

Remedial Investigation and Feasibility Study of the Defense Property Disposal Office, Fort George G. Meade, Maryland. Final Quality Control Plan – 315

Session 7: Energy Saving Performance Contracts: Forms and Financing Options. Overview of Activities Related to Energy Efficiency Improvement in Finland – 133

ENVIRONMENTS

NL Generation for Virtual Humans in a Complex Social Environment – 207

ENZYMES

Effect of Chimaerins, Novel Receptors for Phorbol Esters, on Breast Cancer Cell Proliferation and Cell Cycle Progression – 165

Enzyme-Encapsulated Silica Monolayers for Rapid Functionalization of a Gold Surface PREPRINT – 50

Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 164

Role of the Neddylation Enzyme Uba3, A New Estrogen Receptor Corepressor in Breast Cancer – 154

Silica-Immobilized Enzyme Reactors; Application to Cholinesterase-Inhibition Studies – 155

EPIDEMIOLOGY

Dietary Determinants of Prostate Cancer – 170

Dietary Heterocyclic Amines and Polymorphic Variants in the Etiology of Prostate Cancer – 159

Evaluating Shielding Effectiveness for Reducing Space Radiation Cancer Risks – 334

EPITAXY

Aluminum Nitride Substrate Growth by Halide Vapor Transport Epitaxy – 53

EPITHELIUM

Restoration of Epithelial Polarity in Metastatic Tumors – 150

EPOXY MATRIX COMPOSITES

Effect of Inclusion Morphology on the Coefficient of Thermal Expansion in Filled Epoxy Matrix (Preprint) – 47

EQUATIONS OF STATE

Relativistic Effects on the Equation of State of the Light Actinides – 279

EQUATORIAL REGIONS

Layered Sediments, Rampart Craters, and Potential Fluvio-Lacustrine Activity in S.W. Arabia Terra, Mars: Support for a History of Aqueous Conditions – 332

EROSION

National Shoreline Erosion Control Demonstration Program Overview – 147

ERROR ANALYSIS

Uncertainty Analysis of Historical Hurricane Data – 146

ERRORS

A Summary of Unmanned Aircraft Accident/Incident Data: Human Factors Implications – 10

Design of Error Detection Scheme for Class C Service in ATM – 337

Measurement of the B+ Yields eta l+ nu and B+ Yields eta l+ nu Branching Fractions Using Upsilon(4S) yields B Bbar Event Tagged bu a Fully Reconstructed B Meson. The BABAR Collaboration – 267

ESCAPE SYSTEMS

Minimizing the Sequenced Delay Time for Escape From High-Speed Low-Level Flight Profiles – 9

ESTERS

Effect of Chimaerins, Novel Receptors for Phorbol Esters, on Breast Cancer Cell Proliferation and Cell Cycle Progression – 165

ESTIMATES
Clothing Ventilation Estimates From Manikin Measurements – 185

ESTIMATING
A Distributed and Iterative Method for Square Root Filtering in Space-Time Estimation – 191

A Framework for Non-Gaussian Signal Modeling and Estimation – 187

Estimating Grammar Parameters using Bounded Memory – 239

Estimating the Training Effectiveness of Interactive Air Combat Simulation – 183

MCLUST: Software for Model-Based Clustering, Density Estimation and Discriminant Analysis – 206

ESTROGENS
17Beta-Estradiol Modulates the Response of Human Osteoblasts to Titanium Surface Roughness – 58

Central Leptin Gene Therapy to Reduce Breast Cancer Risk Factors – 166

Characterization of Genetic Modifiers of Estrogen-Induced Mammary Cancer – 154

Estrogen-Induced Depurination of DNA: A Novel Target for Breast Cancer Prevention – 173

Role of the Neddylation Enzyme Uba3, A New Estrogen Receptor Corepressor in Breast Cancer – 154

The Effect of a Home-Based Walking Intervention on Quality of Life, Body Composition, and Estrogen Metabolism in Postmenopausal Breast Cancer Survivors – 169

ETCHING
Devices with Small-Scale Channels and the Fabrication Thereof by Etching – 89

ETHICS
Foundations in the Law: Classic Cases in Medical Ethics – 159

ETHYL ALCOHOL
Spark Ignition Aircraft Engine Endurance Test of Aviation-Grade Ethanol 85 – 37

ETIOLOGY
Dietary Determinants of Prostate Cancer – 170

Dietary Heterocyclic Amines and Polymorphic Variants in the Etiology of Prostate Cancer – 159

EUCLIDEAN GEOMETRY
HARP: A Fast Spectral Partitioner – 231

EVALUATION
Comparative Studies of Proton Accelertors for High Power Applications – 275

Evaluation of a New Liquid Fire-Extinguishing Agent for Combustible Metal Fires – 42

Evaluation of the Modular Semi-Automated Force Air Entity Simulation – 11

Experiments in Evaluating Interactive Spoken Language Systems – 315

Implementation of the Diabetes Practice Guideline in the Army Medical Department: Final Evaluation – 156

Intelligent Mobility Laboratory – 66

Model Selection in Summary Evaluation – 305

Toward the Use of an Upper Ontology for U.S. Government and U.S. Military Domains: An Evaluation – 336

EVANESCENT WAVES
Scattering of Evanescent Acoustic Waves by Regular and Irregular Objects – 282

EVAPORATION
Use of a Spacer Vest to Increase Evaporative Cooling Under Military Body Armor – 297

EVAPORATIVE COOLING
Use of a Spacer Vest to Increase Evaporative Cooling Under Military Body Armor – 297

EXCHANGING
Clothing Ventilation Estimates From Manikin Measurements – 185

EXCITATION
Interior Permanent Magnet Reluctance Machine with Brushless Field Excitation – 85

Tailored Excitation for Frequency Response Measurement Applied to the X-43A Flight Vehicle – 25

EXHAUST EMISSION
Cost-Effective Reciprocating Engine Emissions Control and Monitoring for E&P Field and Gatherings Engines. Report 14. Technical Report, April 1, 2006-June 30, 2006 – 114

Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions – 143

EXHAUST GASES
Cost-Effective Reciprocating Engine Emissions Control and Monitoring for E&P Field and Gatherings Engines. Report 14. Technical Report, April 1, 2006-June 30, 2006 – 114

Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions – 143

EXHAUSTION
Heat Related Illnesses – 179

EXOSPHERE
Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

EXPERIMENT DESIGN
Algorithm for the Iterative Design of Observer Field Tests – 65

Scaling of Thermal-Hydraulic Experiments for a Space Ranking Cycle and Selection of a Preconceptual Scaled Experiment Design – 285

EXPERIMENTATION
Joint Survivability Experiment with Navair – 184

EXPERT SYSTEMS
Bagging Regularizes – 246

Building Explainable Artificial Intelligence Systems – 223

Enhancing Incremental Learning Processes With Knowledge-Based Systems – 312

Using Human Systems Integration and Knowledge Engineering to Define and Design Anti-Terrorism/Force Protection Systems and Solutions – 183

EXPLOSIONS
– 257

EXPLOSIVE DEVICES
Directed Energy System for Defeat of Improvised Explosive Devices and Landmines – 288

EXPLOSIVES
Directed Energy System for Defeat of Improvised Explosive Devices and Landmines – 288

Evolution of Catabolic Pathways for Synthetic Compounds Bacterial Pathways for Degradation of 2,4-dinitrotoluene and Nitrobenzene – 164

EXPONENTS
Lyapunov Exponents for Filtering Problems – 192

EXPOSURE
A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Human Emotional State and its Relevance for Military VR Training – 202

NERL Air Quality Research: Moving Forward. EPA-NOAA Scientists-to-Scientists Meeting. Held on March 2-3, 2004 – 137

Statistical Methods and Software for the Analysis of Occupational Exposure Data with Non-Detectable Values – 242

EXTRACTION
Automated Story Capture From Conversational Speech – 301

Comparison of 2 mrad and 14/20 mrad Crossing Angle Extraction Lines – 296

Geneways for Biocomputing – 309

Information Extraction Supported Question Answering – 309

Nonverbal Behavior Generator for Embodied Conversational Agents – 204

EXTRATERRESTRIAL RADIATION
A Dynamic/Anisotropic Low Earth Orbit (LEO) Ionizing Radiation Model – 334

EXTRATERRESTRIAL WATER
Layered Sediments, Rampart Craters, and Potential Fluvio-Lacustrine Activity in S.W. Arabia Terra, Mars: Support for a History of Aqueous Conditions – 332

EXTRAVEHICULAR ACTIVITY

Locomotor Dysfunction after Spaceflight: Characterization and Countermeasure Development – 151

EXTREMELY HIGH FREQUENCIES

High Power Spatial Combiners: Tile and Tray Approaches – 99

EXTREMELY LOW FREQUENCIES

Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative – 311

F-16 AIRCRAFT

Review of Cranked-Arrow Wing Aerodynamics Project: Its International Aeronautical Community Role – 13

F-22 AIRCRAFT

An Analysis of Earned Value Management Implementation Within the F-22 System Program Office's Software Development – 19

FABRICATION

Carbon Nanotube Filter – 41

Devices with Small-Scale Channels and the Fabrication Thereof by Etching – 89

Electron Beam Freeform Fabrication in the Space Environment – 319

Materials Development for Hypersonic Flight Vehicles – 45

Physics and Fabrication of Quasi-One-Dimensional Conductors – 83

Scaling of Thermal-Hydraulic Experiments for a Space Ranking Cycle and Selection of a Preconceptual Scaled Experiment Design – 285

Tem Mems Device Holder and Method of Fabrication – 93

FACE (ANATOMY)

Face Detection in Still Gray Images – 107

FACTORIZATION

Factorization and Transverse Momentum in SIDIS at JLab – 277

FADDEEV EQUATIONS

Study of the (sub Lambda)(sup 7)He Hypernucleus in Formalism of the Faddeev Equations – 277

FAILURE ANALYSIS

Failure Analysis of a CH-47 Horizontal Hinge Pin Assembly, P/N 114RS226 – 14

FAILURE

A Summary of Unmanned Aircraft Accident/Incident Data: Human Factors Implications – 10

Crack Growth and Stress Intensity Prediction Techniques. Delivery Order 0027-1: Mixed Mode Failure Criteria – 281

Optimally Robust Redundancy Relations for Failure Detection in Uncertain Systems – 216

FAN BLADES

Aerodynamic Performance Measurements for a Forward Swept Low Noise Fan – 2

FAST FOURIER TRANSFORMATIONS

BSAR Computational Analysis and Proposed Mapping. Revision 1 – 238

FAST NUCLEAR REACTORS

LFR Lead Cooled Fast Ractor – 270

FATIGUE (BIOLOGY)

Research of Biomechanical Evaluation Methods of Hand Performance Fatigue – 178

sEMG Dynamics of Muscle Fatigue Induced by Maximal Voluntary Isometric Contractions – 176

FATIGUE (MATERIALS)

Simulation of Delamination Propagation in Composites Under High-Cycle Fatigue by Means of Cohesive-Zone Models – 122

FAULT DETECTION

On-Line Fault Detection and Isolation Using Analytical Redundancy – 80

FEASIBILITY

Remedial Investigation and Feasibility Study of the Defense Property Disposal Office, Fort George G. Meade, Maryland. Final Quality Control Plan – 315

FEATURE IDENTIFICATION AND LOCATION EXPER

A Biological Model of Object Recognition with Feature Learning – 222

FEDERAL BUDGETS

A Comparison of the Navy and the Air Force Budgeting and Execution Process for Aviation Fuel (AVFUEL) – 64

FEEDBACK CONTROL

Analytical Verification of Undesirable Properties of Direct Model Reference Adaptive Control Algorithms – 250

Feedback Linearized Aircraft Control Using Dynamic Cell Structure – 25

State Feedback l(sub 1)-Optimal Controllers can be Dynamic – 215

FEEDBACK

A Framework for Learning Declarative Structure – 239

Geometric Variational Methods for Controlled Active Vision – 223

Robust Controller Design: Minimizing Peak-to-Peak Gain – 252

Rudimentary Force Feedback for Safe Guarded Teleoperation of Unmanned Vehicles: A Simulations and Training Approach – 223

FEET (ANATOMY)

Effects of Speed and Visual-Target Distance on Toe Trajectory During the Swing Phase of Treadmill Walking – 157

FEMALES

Gene Environment Interactions in Women With Breast and Secondary Lung Cancer – 150

Molecular Biology and Prevention of Endometrial Cancer – 170

Prostate Derived Ets Factor, an Immunogenic Breast Cancer Antigen – 166

Soy and Tamoxifen for Breast Cancer Prevention in High Risk Pre-Menopausal Women – 171

FERRITES

Advanced Microwave Ferrite Research (AMFeR): Phase Two – 55

FERROELECTRIC MATERIALS

Phase Transformation of 'Chem-prep' PZT 95/5-2Nb HF 1035 Ceramic Under Quasi-static Loading Conditions – 61

FIBER LASERS

Dispersion Management in a Harmonically Mode-Locked Fiber Soliton Laser – 111

FIBER OPTICS

Analysis of PMD Compensators With Fixed DGD Using Importance Sampling – 98

Fiber Optic Detection of Action Potentials in Axons – 287

Fiber Optic Raman Sensor to Monitor Concentration Ratio of Nitrogen and Oxygen in a Cryogenic Mixture – 286

FIBROBLASTS

The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer – 157

FIELD TESTS

Algorithm for the Iterative Design of Observer Field Tests – 65

Monte Carlo Evaluation of an Iterative Technique for the Design of Observer Field Tests – 187

Techniques for Iterative Design of Observer Field Tests – 65

Techniques for the Statistical Analysis of Observer Data – 248

FIELD-PROGRAMMABLE GATE ARRAYS

Using Heterogeneous High Performance Computing Cluster for Supporting Fine-Grained Parallel Applications – 200

FIGHTER AIRCRAFT

An Analysis of Earned Value Management Implementation Within the F-22 System Program Office's Software Development – 19

Evaluation of the Modular Semi-Automated Force Air Entity Simulation – 11

FILES

Smart Register Files for High-Performance Microprocessors – 215

FILLERS

Orbiter Gap Filler Bending Model for Reentry – 33

FILTERS

Carbon Nanotube Filter – 41

FINANCE
Evolution of the U.S. Housing Finance System: A Historical Survey and Lessons for Emerging Mortgage Markets – 305

Public-Private Partnerships for Government Financing, Controlling Risk, and Value-for-Money: The UK Experience – 317

FINITE DIFFERENCE THEORY
FDTD Analysis of a New Leaky Traveling Wave Antenna – 234

FINITE DIFFERENCE TIME DOMAIN METHOD
FDTD Analysis of a New Leaky Traveling Wave Antenna – 234

FINLAND
Session 7: Energy Saving Performance Contracts: Forms and Financing Options. Overview of Activities Related to Energy Efficiency Improvement in Finland – 133

FIRE EXTINGUISHERS
Evaluation of a New Liquid Fire-Extinguishing Agent for Combustible Metal Fires – 43

FIRE FIGHTING
MAFFS and Military Support to Civil Authority: A Case Study in Command and Control – 73

FIRE PREVENTION
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Amendments to the Fire Protection and Life Safety Provisions of the New York City Building Code by Local Laws Adopted While World Trade Center 1, 2, and 7 Were in Use. NIST NCSTAR 1-1G – 121

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Analysis of Aircraft Impacts into the World Trade Center Towers. Appendix A. Still Images of the Video Records Used in Chapter 7 – 118

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Analysis of Published Accounts of the World Trade Center Evacuation. NIST NCSTAR 1-7A – 120

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of Building Code Structural Requirements. NIST NCSTAR 1-1B – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of Codes, Standards, and Practices in Use at the Time of the Design and Construction of World Trade Center 1, 2, and 7. NIST NCSTAR 1-1E – 118

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of the 1968 and Current (2003) New York City Building Code Provisions. NIST NCSTAR 1-1F – 118

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Contemporaneous Structural Steel Specifications. NIST NCSTAR 1-3A – 120

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. Appendices A-B – 300

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. Appendices A-G – 118

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. Appendices C-G – 300

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. NIST NCSTAR 1-1A. (Appendices not included) – 300

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design, Construction, and Maintenance of Structural and Life Safety Systems. NIST NCSTAR 1-1 – 299

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Documentation of the Fuel System for Emergency Power in World Trade Center 7. NIST NCSTAR 1-1J – 63

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Fire Protection and Life Safety Provisions Applied to the Design and Construction of WTC 1, 2, 7 and Post-Construction Provisions Applied After Occupancy. NIST NCSTAR 1-1D – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Maintenance and Modifications to Structural Systems. NIST NCSTAR 1-1C. (Appendices not included) – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Fires Prior to September 11, 2001. NIST NCSTAR 1-4A – 119

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety, and Structural Systems of World Trade Center 7. NIST NCSTAR 1-1I – 120

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety Systems of the World Trade Center Towers. NIST NCSTAR 1-1H – 121

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Technical Documentation for Survey Administration. Questionnaires, Interviews, and Focus Groups. NIST NCSTAR 1-7B – 119

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: The Emergency Response Operations. Appendices A-L – 119

FIRES
Evaluation of a New Liquid Fire-Extinguishing Agent for Combustible Metal Fires – 43

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Fires Prior to September 11, 2001. NIST NCSTAR 1-4A – 119

Fire Dynamics Simulation (Version 2): Technical Reference Guide – 103

Fire Dynamics Simulator (Version 3) User's Guide – 103

Joint Fire Support in 2020: Development of a Future Joint Fires Systems Architecture for Immediate, Unplanned Targets – 214

User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 208

Validation Experiments to Determine Radiation Partitioning of Heat Flux to an Object in a Fully Turbulent Fire – 104

FISSION PRODUCTS
Analysis of a Gross Counting Decision Metric for Use in Threat Detection During Cargo Container Inspection – 269

FISSION
High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems – 57

Post Irradiation Evaluation of Thermal Control Coatings and Solid Lubricants to Support Fission Surface Power Systems – 114

FITTING
Principles of Fit to Optimize Helmet Sizing – 185

FLAMES
Development of Supersonic Combustion Experiments for CFD Modeling – 106

FLAMMABILITY
Pressure Effects on Oxygen Concentration Flammability Thresholds of Materials for Aerospace Applications – 35

FLAPPING
Progress in Flaps Down Flight Reynolds Number Testing Techniques at the NTF – 12

FLAVOR (PARTICLE PHYSICS)
Physics at the Thomas Jefferson National Accelerator Facility – 280

FLEXURAL STRENGTH
Seismic Measurement of Concrete Strength Properties – 27

FLICKER
Analysis of Flicker Levels in the Slovenian Transmission Network – 82

FLIGHT CHARACTERISTICS

Locomotor Dysfunction after Spaceflight: Characterization and Countermeasure Development – 151

FLIGHT CONTROL

Comanche Helmet-Mounted Display Symbology Simulation – 21

Flight Display Integration – 26

Lessons Learned From Seven Space Shuttle Missions – 33

Tailored Excitation for Frequency Response Measurement Applied to the X-43A Flight Vehicle – 25

FLIGHT MANAGEMENT SYSTEMS

Human Factors Considerations for Performance-Based Navigation – 5

FLIGHT OPERATIONS

Study on Operational Reliability of Astronaut in Spacecraft Cabin – 178

FLIGHT PATHS

Minimizing the Sequenced Delay Time for Escape From High-Speed Low-Level Flight Profiles – 9

FLIGHT SAFETY

Index to FAA Office of Aerospace Medicine Reports: 1961 through 2004 – 18

FLIGHT SIMULATION

Comanche Helmet-Mounted Display Heading-Tape Simulation – 20

Comanche Helmet-Mounted Display Symbology Simulation – 20

Evaluation of the Modular Semi-Automated Force Air Entity Simulation – 11

Intelligent Agents for Computer-Generated Forces – 9

R&D Advances in USAF Pilot Training – 9

Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel – 26

FLIGHT SIMULATORS

Human Factors Evaluation of the Aerial Gunner Scanner Simulator – 8

R&D Advances in USAF Pilot Training – 9

FLIGHT TESTS

Discrete Roughness Transition for Hypersonic Flight Vehicles – 3

Guidance and Control of an Autonomous Soaring UAV – 25

Materials Development for Hypersonic Flight Vehicles – 45

Progress in Flaps Down Flight Reynolds Number Testing Techniques at the NTF – 12

Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel – 26

FLIGHT TRAINING

R&D Advances in USAF Pilot Training – 10

FLOATING POINT ARITHMETIC

A High-Level Formalization of Floating-Point Number in PVS – 204

Procedural Layout of a High-Speed Floating-Point Arithmetic Unit – 94

FLOATING

Floating Refrigerant Loop Based on R-134a Refrigerant Cooling of High-Heat Flux Electronics – 86

FLOORS

Floor Acquisition Multiple Access with Collision Resolution – 217

FLOW CHARACTERISTICS

The Art of Extracting One-Dimensional Flow Properties from Multi-Dimensional Data Sets – 24

FLOW DISTRIBUTION

Efficient Multiscale Regularization with Applications to the Computation of Optical Flow – 106

Fluorescence Visualization of Hypersonic Flow over Rapid Prototype Wind-Tunnel Models – 4

Gappy Data: To Krig or Not To Krig – 242

Heat Transfer and Fluid Dynamics Measurements in the Expansion Space of a Stirling Cycle Engine – 37

Optimal Control of Shock Wave Turbulent Boundary Layer Interactions Using Micro-Array Actuation – 2

Sensor to User - NASA/EOS Data for Coastal Zone Management Applications Developed from Integrated Analyses: Verification, Validation and Benchmark Report – 125

Textile Based Ventilation – 61

Three-Dimensional Computational Model for Flow in an Over-Expanded Nozzle With Porous Surfaces – 1

FLOW THEORY

A Capacity Scaling Algorithm for the Constrained Maximum Flow Problem – 230

FLOW VISUALIZATION

Fluorescence Visualization of Hypersonic Flow over Rapid Prototype Wind-Tunnel Models – 4

Fluorescence Visualization of Hypersonic Flow Past Triangular and Rectangular Boundary-layer Trips – 4

Query-Driven Network Flow Data Analysis and Visualization. Final Report – 187

FLUID DYNAMICS

Benchmark Experimental Database for Multiphase Combustion Model Input and Validation: A Users Follow-Up – 103

Heat Transfer and Fluid Dynamics Measurements in the Expansion Space of a Stirling Cycle Engine – 37

FLUID FLOW

Acquisition of Time-Varying Participating Media – 107

FLUIDICS

Methods for Forming Small-Volume Electrical Contacts and Material Manipulations with Fluidic Microchannels – 104

Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics – 161

FLUORESCENCE

Fluorescence Visualization of Hypersonic Flow over Rapid Prototype Wind-Tunnel Models – 4

FLUORIDES

Thermodynamics of Neptunium(V) Fluoride and Sulfate at Elevated Temperatures – 51

FLUX DENSITY

High Energy Density Polymer Film Capacitors – 96

FLUX PINNING

Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint) – 62

FLUX (RATE)

Modulation in Stator Flux Control of Induction Motor for Reduced Torque Ripple – 77

FOG

Advanced Distributed Simulation and the Fog-of-Simulation: Lessons Learned from the Cockpit – 14

FORECASTING

Calibrated Probabilistic Forecasting at the Stateline Wind Energy Center: The Regime-Switching Space-Time (RST) Method – 147

Environmental Support to Space Launch – 30

Intrusion Detection for Air Force Networks: Environment Forecast – 67

Objective Lightning Probability Forecasting for Kennedy Space Center and Cape Canaveral Air Force Station – 141

Uncertainty Analysis of Historical Hurricane Data – 145

Use of Weather Data to Predict Non-Recurring Traffic Congestion – 142

Using Bayesian Model Averaging to Calibrate Forecast Ensembles – 146

FORESTS

Northwest Forest Plan-The First 10 Years (1994-2003): Synthesis of Monitoring and Research Results – 136

FORMALISM

A Formal Theory of Knowledge and Action – 223

A High-Level Formalization of Floating-Point Number in PVS – 204

Study of the (sub Lambda)(sup 7)He Hypernucleus in Formalism of the Faddeev Equations – 277

Toward a Multi-Robot Coordination Formalism – 224

FORMAT
XML-Native Constraint Evaluation – 253

FORTRAN
Evaluating Co-Array Fortran and Unified Parallel C – 206

FOURIER TRANSFORMATION
Characterization of Lubricants on Ball Bearings by FT-IR Using an Integrating Sphere – 52

In-situ micro-FTIR Study of Thermal Changes of Organics in Tagish Lake Meteorite: Behavior of Aliphatic Oxygenated Functions and Effects of Minerals – 328

Inversion of Generalized Parabolic Projections – 235

FRACTALS
Fractal Estimation using Models on Multiscale Trees – 238

Synthesis, Analysis, and Processing of Fractal Signals – 67

FRACTIONATION
Fractionated Spacecraft Architectures Seeding Study – 30

FRACTURE MECHANICS
Simulation of Delamination Propagation in Composites Under High-Cycle Fatigue by Means of Cohesive-Zone Models – 122

FRACTURE STRENGTH
Fracture Toughness and Strength in a New Class of Bainitic Chromium-Tungsten Steels – 46

FRACTURING
Do Capacitively Coupled Electric Fields Accelerate Tibial Stress Fracture Healing – 86

Ultra High Temperature Ceramics for Hypersonic Vehicle Applications – 58

FREE ELECTRON LASERS
Bunch Length Measurements at the JLab FEL Using Coherent Transition and Synchrotron Radiation – 295

Low-Voltage Infrared Free-Electron Lasers Based on Gyrotron-Powered RF Wigglers – 111

FREQUENCY DIVISION MULTIPLEXING
Performance Analysis of Adaptive Transmission Aided by Long Range Channel Prediction for Realistic Single- and Multi-Carrier Mobile Radio Channels – 71

FREQUENCY RANGES
Tailored Excitation for Frequency Response Measurement Applied to the X-43A Flight Vehicle – 25

FRICTION FACTOR
An Introduction to Heavy-Duty Diesel Engine Frictional Losses and Lubricant Properties Affecting Fuel Economy - Part 1 – 65

FRICTION STIR WELDING
The Effects of Laser Peening and Shot Peening on Mechanical Properties in Friction Stir Welded 7075-T7351 Aluminum – 54

FRICTION
Analysis of the Magnetized Friction Force – 262

Responding to Mechanical Antigravity – 37

Ultra-Hard Low Friction Coating Based on ALMGB14 for Reduced Wear on MEMS and Other Tribiological Components and System – 59

FUEL CELLS
Aircraft Fuel Cell Repair Equipment (AFCRE) – 17

Soldier System Power Sources – 131

FUEL INJECTION
Mixed Mode Fuel Injector and Injection System – 114

FUEL SYSTEMS
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Documentation of the Fuel System for Emergency Power in World Trade Center 7. NIST NCSTAR 1-1J – 63

FUEL TANK PRESSURIZATION
Runtime and Pressurization Analyses of Propellant Tanks – 36

FUELS
Alkaline Electrolysis. Final Technical Report – 53

Biodegradability of JP-8 Fuel in the Aquatic Environment – 63

Elastomer Impact When Switch-Loading Synthetic Fuel Blends and Petroleum Fuels – 63

Near-Infrared Fuel Analysis – 63

Spark Ignition Aircraft Engine Endurance Test of Aviation-Grade Ethanol 85 – 37

Theoretical Considerations Governing the Dehydration of Fuels by Gas Blowing – 43

FULL SCALE TESTS
Overview of Engineering Design and Analysis at the NASA John C. Stennis Space Center – 22

FUNCTIONAL DESIGN SPECIFICATIONS
Commonsense Psychology and the Functional Requirements of Cognitive Models – 219

FUNCTIONALS
On the Onsager-Machlup Functional of Diffusion Processes Around Non C2 Curves – 254

FUZZY SYSTEMS
A Comparison of Mamdani and Sugeno Methods for Modeling Visual Perception Lab Data – 252

GAIT
Development of Training Programs to Optimize Planetary Ambulation – 180

GALACTIC COSMIC RAYS
Evaluating Shielding Effectiveness for Reducing Space Radiation Cancer Risks – 334

Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

GALAXIES
Exploring Speech-Enabled Dialogue with the Galaxy Communicator Infrastructure – 217

GALLIUM ALLOYS
Isothermal (Delta)/(Alpha-Prime) Transformation and TTT Diagram in a Plutonium Gallium Alloy – 38

GALLIUM ARSENIDES
GHz Modulation of GaAs-Based Bipolar Cascade VCSELs (Preprint) – 86

Voltage-Controlled Tunable GaAs/AlGaAs Multistack Quantum Well Infrared Detector – 108

GALLIUM NITRIDES
Gallium Nitride Crystals and Wafers and Method of Making – 265

GAME THEORY
Game Theory and Trade-Off Analysis – 190

Towards Integrating AI Story Controllers and Game Engines: Reconciling World State Representations – 201

GAMES
Mixing Story and Simulation in Interactive Narrative – 203

Using Computer Games to Train Information Warfare Teams – 208

GAMMA RAY BURSTS
The Swift/BAT Hard X-ray Survey – 321

GAMMA RAY OBSERVATORY
Future Gamma-Ray Observations of Pulsars and their Environments – 321

GAMMA RAY SPECTROMETERS
Lu(sup 1)xI(sup 3):Ce(sup x): A Scintillator for Gamma Ray Spectroscopy and Time-Of Flight Pet – 266

GAMMA RAY TELESCOPES
Future Gamma-Ray Observations of Pulsars and their Environments – 321

GARMENTS
A Review of Manned Thermal Garment Diving Studies With Lessons Learned for the SDV Operator and Combat Swimmer – 299

Forced Ventilation of Protective Garments for Hot Industries – 185

GAS CHROMATOGRAPHY
Remedial Investigation and Feasibility Study of the Defense Property Disposal Office, Fort George G. Meade, Maryland. Final Quality Control Plan – 315

GAS TURBINES
Recuperator Assembly and Procedures – 23

GASES

Theoretical Considerations Governing the Dehydration of Fuels by Gas Blowing – 44

GELS

Novel Hydrogels and Uses Thereof – 43

GENE EXPRESSION

Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity – 178

GENE THERAPY

Central Leptin Gene Therapy to Reduce Breast Cancer Risk Factors – 167

Nuclear Imaging for Assessment of Prostate Cancer Gene Therapy – 158

GENES

Gene Environment Interactions in Women With Breast and Secondary Lung Cancer – 150

The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer – 157

Using Genetically Engineered Mice to Probe the Role of Bioactive Lipids in Prostate Carcinogenesis – 157

GENETIC ALGORITHMS

HARP: A Fast Spectral Partitioner – 231

GENETICS

Characterization of Genetic Modifiers of Estrogen-Induced Mammary Cancer – 154

Design of Autonomous Navigation Controllers for Unmanned Aerial Vehicles Using Multi-Objective Genetic Programming – 18

Identification of the Downstream Promoter Targets of Smad Tumor Suppressors in Human Breast Cancer Cells – 160

Naked DNA Immunization of Prevention of Prostate Cancer in a Dunning Rat Prostate Tumor Model – 172

Nuclear Imaging for Assessment of Prostate Cancer Gene Therapy – 158

Spatial-Temporal Mapping of the T Cell Receptor NF-kappaB Signaling Pathway – 152

The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer – 157

GENOME

DNA Precursor Metabolism and Mitochondrial Genome Stability – 173

Trichococcus Patagoniensis sp. nov., a Facultative Anaerobe that grows at -5 C, Isolated from Penguin Guano in Chilean Patagonia – 155

GEOCHEMISTRY

Not So Rare Earth? New Developments in Understanding the Origin of the Earth and Moon – 125

GEOCHRONOLOGY

Sm-Nd and Rb-Sr Ages for MIL 05035: Implications for Surface and Mantle Sources – 331

GEOLOGICAL SURVEYS

Water Resources Publications of the U.S. Geological Survey for Tennessee, 1906-1987 – 124

GEOMETRY

Average Volume of a Random Tetrahedron in a Tetrahedron – 192

Direct Measurement of Geometric and Resistive Wakefields in Tapered Collimators for the International Linear Collider – 267

Hierarchical Reconstruction Using Geometry and Sinogram Restoration – 193

PAC Learning with Generalized Samples and an Application to Stochastic Geometry – 187

GEOTECHNICAL ENGINEERING

Use of Stochastic Modeling of Stratigraphic Relationships in High Resolution Seismic Reflection Data for Prediction of the Distribution of Acoustic and Geotechnical Property Variability in Near Surface Sediments on the East China Sea Continental Margin – 127

GERMANY

Right-Wing Extremism in Germany and the Consequences for the Armed Forces (Rechtsextreme orientierungen in deutschland und ihre folgen fuer die bundeswehr) – 336

GETTERS

New High Capacity Getter for Vacuum Insulated Mobile Liquid Hydrogen Storage Systems – 105

GLASS

Composition Range and Glass Forming Ability of Ternary Ca-Mg-Cu Bulk Metallic Glasses (Preprint) – 55

GLIDERS

An Autonomous Glider Network for the Monterey Bay Predictive Skill Experiment / AOSN-II – 10

GLOBAL POSITIONING SYSTEM

Measured Effects of a Narrowband Interference Suppressor on GPS Receivers – 99

Multipath Mitigation Performance of Planar GPS Adaptive Antenna Arrays for Precision Landing Ground Stations – 95

GLOBULAR CLUSTERS

Luminosity Function of Faint Globular Clusters in M87 – 324

GLUTAMATES

Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 165

GLYCOLYSIS

Optical Spectroscopy and Multiphoton Imaging for the Diagnosis and Characterization of Hyperplasias in the Mouse Mammary – 172

GOLD

Enzyme-Encapsulated Silica Monolayers for Rapid Functionalization of a Gold Surface PREPRINT – 50

Structure and Function Evolution of Thiolate Monolayers on Gold – 48

GONIOMETERS

An Inductively Coupled Goniometer for Wide-Aperture DF Arrays – 286

GOVERNMENT PROCUREMENT

Industry Analysis for Body Armor Procurement – 186

GOVERNMENT/INDUSTRY RELATIONS

Effective Teamwork: The EVA NBL Experience – 299

GOVERNMENTS

Public-Private Partnerships for Government Financing, Controlling Risk, and Value-for-Money: The UK Experience – 317

U.S. Security Posture in the Middle East: Need for a Change – 336

GRADIENTS

High Gradient Operation with the CEBAF Upgrade RF Control System – 269

GRAIN SIZE

Performances of High Purity Niobium Cavities with Different Grain Sizes – 258

GRAMMARS

Estimating Grammar Parameters using Bounded Memory – 239

Identifying Semantic Roles Using Combinatory Categorial Grammar – 206

Speed and Accuracy in Shallow and Deep Stochastic Parsing – 241

Two Algorithms for Learning the Parameters of Stochastic Context-Free Grammars – 239

GRAPHICAL USER INTERFACE

Building Explainable Artificial Intelligence Systems – 224

The Case for an Open Data Model – 201

User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 208

GRAPHITIZATION

Application of Carbon Based Nano-Materials to Aeronautics and Space Lubrication – 114

GRAPHS (CHARTS)
Architecture for Rendering Graphics on Output Devices Over Diverse Connections – 306
Iterative Structure Discovery in Graph-Based Data – 249
Subdue: Compression-Based Frequent Pattern Discovery in Graph Data – 302

GRATINGS (SPECTRA)
Gratings for High Energy Petawatt Lasers – 279
Investigating Shape Representation in Area V4 with HMAX: Orientation and Grating Selectivities – 224

GRAVITATIONAL EFFECTS
Gravitational Gauge Mediation – 276

GRAVITATIONAL FIELDS
Electron Beam Freeform Fabrication in the Space Environment – 319
The ROSSI X-Ray Timing Explorer: Capabilities, Achievements and Aims – 325

GREENHOUSE EFFECT
Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions – 144

GRID COMPUTING (COMPUTER NETWORKS)
Grid Nesting with STWAVE – 189

GRID GENERATION (MATHEMATICS)
Grid Nesting with STWAVE – 189
Mesh Partitioning with Ant Colonies – 76

GROUND STATIONS
Multipath Mitigation Performance of Planar GPS Adaptive Antenna Arrays for Precision Landing Ground Stations – 95

GROUND SUPPORT EQUIPMENT
The Development of a Business Case Analysis for the Acquisition of the Agile Rapid Global Combat Support System Used for the USA Marine Corps' Ground Equipment – 66
Ultra Low Volume Dispersal of Insecticides by Ground Equipment – 40

GROUND WATER
Chemical Character of Ground Water in the Shallow Water-Table Aquifer at Selected Localities in the Memphis Area, Tennessee – 38
Ground-Water and Pond Levels, Cape Code, Massachusetts, 1950-82 – 123
Ground-Water Quality Data From the Northern Mississippi Embayment--Arkansas, Missouri, Kentucky, Tennessee, and Mississippi – 123

GROUPS
Antigone: Implementing Policy in Secure Group Communication – 69
Ismene: Provisioning and Policy Reconciliation in Secure Group Communication – 69

GUIDANCE (MOTION)
Numerical Skip-Entry Guidance – 32

GYROSCOPES
Responding to Mechanical Antigravity – 37

HADRONS
Measurement of the B+ Yields eta l+ nu and B+ Yields eta l+ nu Branching Fractions Using Upsilon(4S) yields B Bbar Event Tagged bu a Fully Reconstructed B Meson. The BABAR Collaboration – 267
New Perspectives for QCD From AdS/CFT – 259
QT-Reummation for Polarized Semi-Inclusive Deep Inelastic Scattering – 260
Recent tau Physics Studies at BABAR – 263

HALIDES
Aluminum Nitride Substrate Growth by Halide Vapor Transport Epitaxy – 53

HAND (ANATOMY)
Research of Biomechanical Evaluation Methods of Hand Performance Fatigue – 178

HARDWARE-IN-THE-LOOP SIMULATION
Hardware-in-the-Loop Testing of Wireless Systems in Realistic Environments – 70

HAZARDOUS MATERIALS
Adaptive Sampling and Analysis Programs (ASAPs) – 51

HAZARDS
Powered Descent Trajectory Guidance and Some Considerations for Human Lunar Landing – 331
Technical Basis Document for Natural Event Hazards – 136

HEALING
Do Capacitively Coupled Electric Fields Accelerate Tibial Stress Fracture Healing – 86

HEALTH
Breast Cancer Prevention by Inducing Apoptosis in DCIS Using Breast Ductal Lavage – 168
Lymphedema Prophylaxis Utilizing Perioperative Education – 159
Report Back from the NCI-Wide Workshop: Enhancing Interactions to Reduce Cancer Health Disparities. Held on July 17th, 2006 – 306
Risk Management and Medical Liability: A Manual for Indian Health Service and Tribal Health Care Professionals. Second Edition – 304

HEAT BALANCE
Effect of Palm Cooling with Negative Pressure on Heat Balance During Exercise in a Hot, Dry Environment – 157

HEAT EXCHANGERS
Experimental Studies of IBS in RHIC and Comparison with Theory – 262

HEAT FLUX
Floating Refrigerant Loop Based on R-134a Refrigerant Cooling of High-Heat Flux Electronics – 86
Validation Experiments to Determine Radiation Partitioning of Heat Flux to an Object in a Fully Turbulent Fire – 104

HEAT RESISTANT ALLOYS
High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems – 57

HEAT SHIELDING
A Simplified Approach for the Rapid Generation of Transient Heat-Shield Environments – 34

HEAT STORAGE
Thermal Storage Commercial Plant Design Study for a 2-Tank Indirect Molten Salt System. Final Report for May 13, 2002 to December 31, 2004 – 128

HEAT STROKE
Heat Related Illnesses – 179

HEAT TOLERANCE
Heat Related Illnesses – 179

HEAT TRANSFER
Heat Transfer and Fluid Dynamics Measurements in the Expansion Space of a Stirling Cycle Engine – 37

HEATERS
Radio-Frequency Driven Dielectric Heaters for Non-Nuclear Testing in Nuclear Core Development – 285
Telescopic Imaging of Heater-Induced Airglow at HAARP – 326

HEAVY ELEMENTS
LLNL Heavy Element Facility-Facility Management, Authorization Basis, and Readiness Assessment Lessons Learned in the Heavy Element Facility (B251) Transition from Category II Nuclear Facility to Radiological Facility – 137

HEAVY IONS
Heavy Ion Propulsion in the Megadalton Range – 36

HELIOSPHERE
Inverse Compton Scattering on Solar Photons, Heliospheric Modulation, and Neutrino Astrophysics – 323
Trains of Magnetic Holes and Magnetic Humps in the Heliosheath – 325

HELMET MOUNTED DISPLAYS
A Unified Taxonomic Approach to the Laboratory Assessment of Visionic Devices – 184
Comanche Helmet-Mounted Display Heading-Tape Simulation – 20
Comanche Helmet-Mounted Display Symbology Simulation – 20

HELMETS
Effects of Head Mounted Devices on Head-Neck Dynamic Response to +GZ Accelerations – 181

Mass Properties and Inertial Loading Effects of Head Encumbering Devices – 181

Principles of Fit to Optimize Helmet Sizing – 185

HETEROCYCLIC COMPOUNDS

Dietary Heterocyclic Amines and Polymorphic Variants in the Etiology of Prostate Cancer – 160

HETEROGENEITY

Broadcast with Heterogeneous Node Capability – 88

Using Heterogeneous High Performance Computing Cluster for Supporting Fine-Grained Parallel Applications – 199

HETEROJUNCTIONS

Performance Improvement in Quantum Well Lasers by Optimizing Band Gap Offset at Quantum Well Heterojunctions – 111

HEURISTIC METHODS

A Novel Power-Efficient Broadcast Routing Algorithm Exploiting Broadcast Efficiency – 133

HIERARCHIES

Hierarchical Reconstruction Using Geometry and Sinogram Restoration – 193

LIFT - The LIsp Framework for Testing – 211

Training Tree Transducers – 230

HIGH ALTITUDE

High Altitude Long Endurance Air Vehicle Analysis of Alternatives and Technology Requirements Development – 14

HIGH ENERGY INTERACTIONS

Measurement of B Decays to PhiK-Gamma – 278

HIGH FIELD MAGNETS

High Field Solenoid Magnets for Muon Cooling – 261

HIGH POWER LASERS

Gratings for High Energy Petawatt Lasers – 279

HIGH PRESSURE

CALE EOS Form 2 Fits for High Pressure Fused Silica Hugoniot Data – 39

HIGH RESOLUTION

The ROSSI X-Ray Timing Explorer: Capabilities, Achievements and Aims – 325

Use of Stochastic Modeling of Stratigraphic Relationships in High Resolution Seismic Reflection Data for Prediction of the Distribution of Acoustic and Geotechnical Property Variability in Near Surface Sediments on the East China Sea Continental Margin – 127

HIGH SPEED

An Integrated Tool for High Speed Circuit Design Including Substrate Effects – 98

Minimizing the Sequenced Delay Time for Escape From High-Speed Low-Level Flight Profiles – 9

Procedural Layout of a High-Speed Floating-Point Arithmetic Unit – 94

HIGH STRENGTH

High Tensile Strength Carbon Nanotube Film and Process for Making the Same – 293

HIGH TEMPERATURE ENVIRONMENTS

Effect of Palm Cooling with Negative Pressure on Heat Balance During Exercise in a Hot, Dry Environment – 157

HIGH TEMPERATURE

Application of Carbon Based Nano-Materials to Aeronautics and Space Lubrication – 114

Computational Design of UHTC Materials for Hypersonic Applications (Preprint) – 61

Status of Physics and Safety Analyses for the Liquid Salt Cooled Very High Temperature Reactor (LS-VHTR) – 285

Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel – 26

Thermodynamics of Neptunium(V) Fluoride and Sulfate at Elevated Temperatures – 51

Ultra High Temperature Ceramics for Hypersonic Vehicle Applications – 58

HIGH VACUUM

New High Capacity Getter for Vacuum Insulated Mobile Liquid Hydrogen Storage Systems – 105

HIGHWAYS

Advanced Quality Systems: Guidelines for Establishing and Maintaining Construction Quality Databases – 303

Assessment of Historic Landscape, Highway 45 Borrow Pit, Jefferson Parish, Louisiana – 124

HINDLIMB SUSPENSION

Effects of Tail Suspension on Renin-angiotensin System in Rat Myocardium – 177

Prophylactic Effects of Choline Chloride on Muscle Atrophy in Tail-suspended Rats – 177

Protective Effects of Vitamin E on Injury to Male Reproductive Function in Tail-suspended Rats – 179

HINGES

Failure Analysis of a CH-47 Horizontal Hinge Pin Assembly, P/N 114RS226 – 14

HISTORIES

Competing for the Future: A Historical Review of NIST ATP Investments in Photonics and Optical Technologies – 87

Competing for the Future: A Historical Review of NIST ATP Investments in Semiconductor and Micro/Nano-Electronics – 86

Competing for the Future: Unlocking Small Wonders for Tomorrow's Nanoelectronic Uses – 86

Evolution of the U.S. Housing Finance System: A Historical Survey and Lessons for Emerging Mortgage Markets – 305

HOLDERS

Powder Handling Device for Analytical Instruments – 113

Tem Mems Device Holder and Method of Fabrication – 93

HOLES (MECHANICS)

Bearing-Load Modeling and Analysis Study for Mechanically Connected Structures – 116

HOMEOSTASIS

Molecular Mechanisms of Prostate Cancer Progression – 171

HOMOGENIZING

Innovative Mechanism-Based Textile Composite Damage Modeling Basing on a Nonlinear Fiber Model and Enhanced Homogenization Method – 45

HORMONES

Central Leptin Gene Therapy to Reduce Breast Cancer Risk Factors – 167

Inhibitory Ah Receptor-Androgen Receptor Crosstalk in Prostate Cancer – 170

Molecular Biology and Prevention of Endometrial Cancer – 170

HOT ISOSTATIC PRESSING

High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems – 57

HOT PRESSING

The Effect of Hot Isostatic Pressing on the Optical Properties Of Spinel – 62

HUMAN BEHAVIOR

Evaluating a Computational Model of Emotion – 233

HUMAN BEINGS

Facilitating Treatment Decision Making, Adjustment, and Coping in Men Newly Diagnosed with Prostate Cancer. Addendum – 164

NL Generation for Virtual Humans in a Complex Social Environment – 207

HUMAN BODY

Creating Interactive Virtual Humans: Some Assembly Required – 206

Toward a New Generation of Virtual Humans for Interactive Experiences – 205

HUMAN FACTORS ENGINEERING

A Summary of Unmanned Aircraft Accident/Incident Data: Human Factors Implications – 10

Development of Air Traffic Control Measurement Database – 7

Human Factors Considerations for Performance-Based Navigation – 5

Human Factors Evaluation of the Aerial Gunner Scanner Simulator – 8

Investigation of the Effects of Restraint Design Variations on Human Responses to Impact – 182

Operational Interventions to Maintenance Error – 5

Study on Modified Delphi Method as Used for Index Filtration in Ergonomic Evaluation of Cockpit Display – 176

Study on Operational Reliability of Astronaut in Spacecraft Cabin – 178

Two Chapters of Technical Report: Unmanned Military Vehicles - Human Factors of Augmenting the Force Chapter 1: Introduction Chapter 8: Summary: Issues and Conclusions – 185

Using Human Systems Integration and Knowledge Engineering to Define and Design Anti-Terrorism/Force Protection Systems and Solutions – 183

HUMAN PERFORMANCE

Human Dimensions of Strategic Leadership: A Selected Bibliography – 299

Two Chapters of Technical Report: Unmanned Military Vehicles - Human Factors of Augmenting the Force Chapter 1: Introduction Chapter 8: Summary: Issues and Conclusions – 185

HUMAN REACTIONS

Human Haptic Interaction with Soft Objects: Discriminability, Force Control, and Contact Visualization – 182

HUMAN RESOURCES

Effective Teamwork: The EVA NBL Experience – 299

Strategic Plan: 2000-2005 – 309

HUMAN-COMPUTER INTERFACE

Improving Human Interfaces in Military Simulation Applications – 211

Virtual Rapport – 218

HUMIDITY MEASUREMENT

Transient Sweat Rate Calculation from Humidity Measurements Under Clothing – 298

HUMIDITY

Transient Sweat Rate Calculation from Humidity Measurements Under Clothing – 298

HURRICANES

Uncertainty Analysis of Historical Hurricane Data – 146

HUYGENS PROBE

Titan Orbiter with Aerorover Mission (TOAM) – 319

HYBRID PROPELLANT ROCKET ENGINES

Modeling and Analysis of Facility Systems for A Hybrid Materials Test Program – 63

HYDRAULIC EQUIPMENT

Corrosion Preventing Characteristics of Military Hydraulic Fluids. Part 2 – 57

On-Line Fault Detection and Isolation Using Analytical Redundancy – 80

HYDRAULIC FLUIDS

Corrosion Preventing Characteristics of Military Hydraulic Fluids. Part 2 – 57

HYDRAULICS

Scaling of Thermal-Hydraulic Experiments for a Space Ranking Cycle and Selection of a Preconceptual Scaled Experiment Design – 285

Unsteady Storm Drainage Modeling Within the U.S. Army Corps of Engineers GSSHA Model – 106

HYDRODYNAMICS

– 257

HYDROELECTRIC POWER STATIONS

The Flores Mixed Integer Linear Programming Model for the Optimal Response of Hydro Cascades in the Electricity Spot Market – 81

HYDROELECTRICITY

The Flores Mixed Integer Linear Programming Model for the Optimal Response of Hydro Cascades in the Electricity Spot Market – 81

HYDROGEN IONS

Comparison Between H-Ion and Heat Cleaning of CU-Metal Cathodes – 269

HYDROGEN PEROXIDE

Concentration of Hydrogen Peroxide – 47

HYDROGEN

Action Concentration for Mixtures of VOCs, Methane and Hydrogen – 50

Alkaline Electrolysis. Final Technical Report – 52

HYDROMETEOROLOGY

An Integrated High Resolution Hydrometeorological Modeling Testbed using LIS and WRF – 145

HYDROPHOBICITY

Investigating the Interface of Superhydrophobic Surfaces in Contact With Water – 47

Study of Self-Assembly Monolayers for Colloidal Processing of Ceramics and Textured, Super-Hydrophobic – 58

HYPERNUCLEI

Study of the (sub Lambda)(sup 7)He Hypernucleus in Formalism of the Faddeev Equations – 277

HYPERSONIC FLOW

Fluorescence Visualization of Hypersonic Flow over Rapid Prototype Wind-Tunnel Models – 4

Fluorescence Visualization of Hypersonic Flow Past Triangular and Rectangular Boundary-layer Trips – 4

HYPERSONIC SPEED

Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel – 26

HYPERSONIC VEHICLES

Discrete Roughness Transition for Hypersonic Flight Vehicles – 3

Materials Development for Hypersonic Flight Vehicles – 45

Tailored Excitation for Frequency Response Measurement Applied to the X-43A Flight Vehicle – 25

Ultra High Temperature Ceramics for Hypersonic Vehicle Applications – 58

HYPERSONICS

Computational Design of UHTC Materials for Hypersonic Applications (Preprint) – 61

Development of Supersonic Combustion Experiments for CFD Modeling – 105

HYPERVELOCITY IMPACT

STS-114 Micrometeoroid/Orbital Debris (MMOD) Post-Flight Assessment – 330

Survey of the Hypervelocity Impact Technology and Applications – 28

ICE FORMATION

Investigations of Performance of Pneumatic Deicing Boots, Surface Ice Detectors, and Scaling of Intercycle Ice – 3

ICE

Investigations of Performance of Pneumatic Deicing Boots, Surface Ice Detectors, and Scaling of Intercycle Ice – 3

IDENTIFYING

Identifying Semantic Roles Using Combinatory Categorial Grammar – 206

Method and System for Identifying Damage to a Wire – 92

Novel Angiogenic Domains: Use in Identifying Unique Transforming and Tumor Promoting Pathways in Human Breast Cancer – 162

Preserving Privacy by De-identifying Facial Images – 73

Structures Including Network and Topology for Identifying, Locating and Quantifying Physical Phenomena – 39

IDENTITIES

Personal Identity Verification Demonstration Summary – 195

IGNITION

High Energy X-Ray Imager for Inertial Confinment Fusion at the National Ignition Facility – 272

Method and Device for Creating a Micro Plasma Jet – 23

IIR FILTERS

Efficient Implementations of 2-D Noncasual IIR Filters – 234

ILLUMINATING

Postproduction Re-Illumination of Live Action Using Time-Multiplexed Lighting – 287

Trends and Opportunities in Photonics Technologies: Solid-State Lighting and Healthcare – 87

IMAGE ANALYSIS

Face Detection in Still Gray Images – 107

Markov Random Fields, Stochastic Quantization and Image Analysis – 243

Neural Mechanisms of Object Recognition – 190

Target/Background Polarization Profiles Using a COTS Digital Camera – 108

Using 3-Dimensional Meshes to Combine Image-Based and Geometry Constraints – 228

IMAGE CLASSIFICATION

Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 125

IMAGE ENHANCEMENT

Target/Background Polarization Profiles Using a COTS Digital Camera – 108

IMAGE PROCESSING

A Support Vector Machine Application on Vehicles – 107

Computational Limitations of Model Based Recognition – 207

Curve and Polygon Evolution Techniques for Image Processing – 199

Face Detection in Still Gray Images – 107

JPEG 2000 and WSQ Image Compression Interoperability – 186

Object-Centered Surface Reconstruction: Combining Multi-Image Stereo and Shading – 227

Registration without Correspondences – 227

Standardization of Object Oriented Extensions to Vector Signal and Image Processing Library (VSIPL) – 209

Using 3-Dimensional Meshes to Combine Image-Based and Geometry Constraints – 228

IMAGE RECONSTRUCTION

A Wavelet-Based Method for Multiscale Tomographic Reconstruction – 257

Face Detection in Still Gray Images – 107

IMAGE RESOLUTION

Multiresolution Optimal Interpolation and Statistical Analysis of Topex/Poseidon Satellite Altimetry – 238

IMAGERY

External View of the DARPA Grand Challenge – 336

New Hyperspectral Discrimination Measure for Spectral Characterization – 228

IMAGES

A Comparison of the Detection Rates for Infrared and Visual Imagery of a Person Holdina an RPG – 110

Computer-Aided Detection of Mammographic Masses in Dense Breast Images – 150

Determining the Number of Colors or Gray Levels in an Image Using Approximate Bayes Factors: The Pseudolikelihood Information Criterion (PLIC) – 245

Direction Estimation of Pedestrian from Images – 291

Dissociated Dipoles: Image Representation via Non-local Comparisons – 255

Dynamic IR Scene Projector Based Upon the Digital Micromirror Device – 74

Efficient Multiscale Regularization with Applications to the Computation of Optical Flow – 106

Passive Panoramic Image Fusion (PPIF) for 360 Degree Situational Awareness to Support Operations in Urban Terrain – 124

People Recognition in Image Sequences by Supervised Learning – 286

Preserving Privacy by De-identifying Facial Images – 73

Telescopic Imaging of Heater-Induced Airglow at HAARP – 326

Workshop for Open Source Universal Picture Archiving and Communication Systems (PACS) – 110

IMAGING TECHNIQUES

Analysis of fMRI Data by Blind Separation into Independent Spatial Components – 169

Direct Imaging of Stellar Surfaces: Results from the Stellar Imager (SI) Vision Mission Study – 325

High Energy X-Ray Imager for Inertial Confinment Fusion at the National Ignition Facility – 272

In-vivo Imaging of the Photoreceptor Mosaic in Retinal Dystrophies and Correlation with Visual Function – 290

Model-Based Clustering for Image Segmentation and Large Datasets Via Sampling – 189

Multiscale Signal Processing and Shape Analysis for an Inverse Sar Imaging System – 109

Multispectral X-Ray Imaging for Core Temperature and Density Maps Retrieval in Direct Drive Implosions – 272

Nuclear Imaging for Assessment of Prostate Cancer Gene Therapy – 158

Optical Spectroscopy and Multiphoton Imaging for the Diagnosis and Characterization of Hyperplasias in the Mouse Mammary – 172

Telescopic Imaging of Heater-Induced Airglow at HAARP – 326

Test Report on the November 2005 NATO RTG-40 Active Imager Land Field Trials – 108

Three Dimensional Reconstruction Algorithm for Imaging Pathophysiological Signals Within Breast Tissue Using Near Infrared Light – 154

Transverse Imaging of the Proton in Exclusive Diffractive PP Scattering – 279

Wave Based Inversion and Imaging for the Optical Quadrature Microscope – 290

IMMUNE SYSTEMS

Effects of Irradiation with Different Dose Rates of X-ray on Mouse Immune System – 177

IMMUNOLOGY

Glycopetide-Based Immunotherapy for Prophylaxis and Treatment of Mammary Adenocarcinomas – 149

Naked DNA Immunization of Prevention of Prostate Cancer in a Dunning Rat Prostate Tumor Model – 172

IMPACT ACCELERATION

Loads Induced in the Lumbar Spine of Seated Restrained Humans by Sideward (+Gy) Impact – 181

Mass Properties and Inertial Loading Effects of Head Encumbering Devices – 181

IMPACT TESTS

Procedure for Near-Simultaneous Testing – 113

IMPACT

Dynamic Preload as an Impact Protection Concept – 266

Investigation of the Effects of Restraint Design Variations on Human Responses to Impact – 182

Procedure for Near-Simultaneous Testing – 113

IMPEDANCE

Rotating Rake Mode Measurements Over Passive Treatment in a Ducted Fan – 283

IMPLOSIONS

Multispectral X-Ray Imaging for Core Temperature and Density Maps Retrieval in Direct Drive Implosions – 272

IMPROVEMENT

Lean Six Sigma for Reduced Cycle Costs and Improved Readiness – 317

IN SITU MEASUREMENT

In-situ micro-FTIR Study of Thermal Changes of Organics in Tagish Lake Meteorite: Behavior of Aliphatic Oxygenated Functions and Effects of Minerals – 329

IN VITRO METHODS AND TESTS

Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity – 178

IN VIVO METHODS AND TESTS

In-vivo Imaging of the Photoreceptor Mosaic in Retinal Dystrophies and Correlation with Visual Function – 291

INCLUSIONS

The Origin of Dark Inclusions in Allende: New Evidence from Lithium Isotopes – 331

INDENTATION
Compression and Instrumented Indentation Measurements on Biomimetic Polymers – 40

INDEPENDENT VARIABLES
Uncertainty Analysis of Historical Hurricane Data – 146

INDEXING (INFORMATION SCIENCE)
Feature Normalization for Video Indexing and Retrieval – 302

INDIUM GALLIUM ARSENIDES
Sub-100 muA Current Operation of Strained InGaAs Quantum Well Lasers at Low TemperaturesL – 112

INDUCTION MOTORS
Modulation in Stator Flux Control of Induction Motor for Reduced Torque Ripple – 77

INDUSTRIAL PLANTS
Energy Assessment Strategy and Energy Concepts for Industrial Facilities – 135

ESPC Issues: DOE Super Energy Savings Performance Contracts – 134

INDUSTRIES
Analysis of Industrial Power Networks – 80

Competing for the Future: A Historical Review of NIST ATP Investments in Semiconductor and Micro/Nano-Electronics – 86

Constellation Stretch Goals: Review of Industry Inputs – 250

Evolution of the U.S. Housing Finance System: A Historical Survey and Lessons for Emerging Mortgage Markets – 305

Forced Ventilation of Protective Garments for Hot Industries – 185

Industry Analysis for Body Armor Procurement – 186

INELASTIC SCATTERING
QT-Reummation for Polarized Semi-Inclusive Deep Inelastic Scattering – 261

INERTIAL CONFINEMENT FUSION
High Energy X-Ray Imager for Inertial Confinment Fusion at the National Ignition Facility – 272

INERTIA
Effects of Head Mounted Devices on Head-Neck Dynamic Response to +GZ Accelerations – 181

Mass Properties and Inertial Loading Effects of Head Encumbering Devices – 181

INFECTIOUS DISEASES
Enhancing the Immunogenicity of a Dengue-2 DNA Vaccine with Adjuvants and Anti-Fc(gamma)RI Antibodies – 163

Epidemic Outbreak Surveillance (EOS) – 168

Fully Virulent Bacillus Anthracis Does Not Require the Immunodominant Protein BclA for Pathogenesis – 164

Lymphedema Prophylaxis Utilizing Perioperative Education – 159

MiTAP for Bio-Security: A Case Study – 311

Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 164

INFERENCE
Bayesian Inference for Color Image Quantization via Model-Based Clustering Trees – 191

Model Validation and Spatial Interpolation by Combining Observations with Outputs from Numerical Models via Bayesian Melding – 244

Multiscale Representations of Markov Random Fields – 247

INFORMATION DISSEMINATION
Fusion Center Guidelines: Developing and Sharing Information and Intelligence in a New Era – 304

INFORMATION FLOW
Sensor to User - NASA/EOS Data for Coastal Zone Management Applications Developed from Integrated Analyses: Verification, Validation and Benchmark Report – 126

INFORMATION MANAGEMENT
Automated Story Capture From Conversational Speech – 301

Geneways for Biocomputing – 309

The Development of a Logistical Body of Knowledge for the Department of Defense – 313

INFORMATION PROCESSING (BIOLOGY)
Realistic Modeling of Simple and Complex Cell Tuning in the HMAX Model, and Implications for Invariant Object Recognition in Cortex – 182

INFORMATION RETRIEVAL
Fully Automatic Cross-Associations – 303

Geneways for Biocomputing – 309

Iterative Structure Discovery in Graph-Based Data – 249

Named Entity Recognition as a House of Cards: Classifier Stacking – 235

Subdue: Compression-Based Frequent Pattern Discovery in Graph Data – 302

Tasks, Domains, and Languages – 308

The Database as Model: A Metatheoretic Approach – 314

Tri-Plots: Scalable Tools for Multidimensional Data Mining – 308

UMass at TREC 2003: HARD and QA – 312

UMass at TREC 2004: Novelty and HARD – 310

When is an Embedded MT System 'Good Enough' for Filtering? – 308

INFORMATION SYSTEMS
A Team User's Guide – 314

Assessment of Access Control Systems – 195

Byblos Speech Recognition Benchmark Results – 226

CETIS: Complex Effluents Toxicity Information System. CETIS Retrieval System User's Manual – 306

Defense in Depth: Foundation for Secure and Resilient IT Enterprises – 218

Enhancing Incremental Learning Processes With Knowledge-Based Systems – 312

MiTAP for Bio-Security: A Case Study – 311

MiTPA for Real Users, Real Data, Real Problems – 307

Personal Identity Verification Demonstration Summary – 195

Semantic Web Rule Languages – 213

Study of Attrition Documentation at the U.S. Navy Recruit Training Command – 310

INFORMATION TRANSFER
Semantic Web Rule Languages – 213

Virtual Design and Testing of Materials: A Multiscale Approach – 40

INFORMATION
Simulation Activities Using Gateway and Tactical Digital Information Links – 73

INFRARED DETECTORS
A Comparison of the Detection Rates for Infrared and Visual Imagery of a Person Holdina an RPG – 110

Step Current Inductive Antenna for Pulse Inductive Metal Detector – 91

Voltage-Controlled Tunable GaAs/AlGaAs Multistack Quantum Well Infrared Detector – 108

INFRARED IMAGERY
A Comparison of the Detection Rates for Infrared and Visual Imagery of a Person Holdina an RPG – 110

INFRARED LASERS
Low-Voltage Infrared Free-Electron Lasers Based on Gyrotron-Powered RF Wigglers – 111

INFRARED RADIATION
Quantum Interference Effect and Electric Field Domain Formation in Quantum Well Infrared Photodetectors – 109

INFRARED SPECTROMETERS
MEMS Microshutter for James Webb Space Telescope – 319

INFRARED SPECTROSCOPY
Characterization of Lubricants on Ball Bearings by FT-IR Using an Integrating Sphere – 52

In-situ micro-FTIR Study of Thermal Changes of Organics in Tagish Lake Meteorite: Behavior of Aliphatic Oxygenated Functions and Effects of Minerals – 328

INFRARED WINDOWS
Transparent Yttria for IR Windows and Domes - Past and Present – 292

INHIBITORS
The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer – 157

INJECTION
Mixed Mode Fuel Injector and Injection System – 114

INJECTORS
Commissioning of the Digital LLRF for CEBAF Injector/Separator – 269

Pressure Model for the Vacuum System for the Electron Gun and Injector for LCLS Final Design Report – 271

Simulation and Optimisation of a 100MA DC Photo-Injector – 258

Studies of E-Cloud Build up the the FNAL Main Injector and for the LHC – 265

INJURIES
A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Loads Induced in the Lumbar Spine of Seated Restrained Humans by Sideward (+Gy) Impact – 181

Preliminary Derivation of Test Item Clusters for Predicting Injuries, Poor Physical Performance, and Overall Attrition in Basic Combat Training – 253

Protective Effects of Vitamin E on Injury to Male Reproductive Function in Tail-suspended Rats – 179

INSECTICIDES
Ultra Low Volume Dispersal of Insecticides by Ground Equipment – 40

INSPECTION
Analysis of a Gross Counting Decision Metric for Use in Threat Detection During Cargo Container Inspection – 269

INSTALLING
Installation and Sampling of Observation Wells and Analyses of Water From the Shallow Aquifer at Selected Waste-Disposal Sites in the Memphis Area, Tennessee – 123

Project Clinker, Hydraulic Carriage for Airship Installation of Optical Equipment – 16

INSTRUMENT ERRORS
Uncertainty of the Characteristic of the Size-of-Source Effect in Radiation Thermometers – 82

INSULATION
Methods and Systems for Testing Wire Insulation – 92

INSULIN
Central Leptin Gene Therapy to Reduce Breast Cancer Risk Factors – 167

INTEGRALS
On the Relation of Anticipative Stratonovich and Symmetric Integrals: A Decomposition Formula – 189

INTEGRATED CIRCUITS
An Integrated Tool for High Speed Circuit Design Including Substrate Effects – 98

INTEGRATED OPTICS
Integrated Cooling for Optoelectronic Devices – 287

INTELLIGENCE
A Need to Know: The Role of Air Force Reconnaissance in War Planning, 1945-1953 – 17

Fusion Center Guidelines: Developing and Sharing Information and Intelligence in a New Era – 303

INTERFACES
Investigating the Interface of Superhydrophobic Surfaces in Contact With Water – 47

INTERFEROMETERS
Design Considerations for the Second-Generation NPOI Fringe Tracker and Science Beam Combiner – 292

Direct Imaging of Stellar Surfaces: Results from the Stellar Imager (SI) Vision Mission Study – 325

INTERFEROMETRY
Noninvasive Characterization of a Flowing Multiphase Fluid Using Ultrasonic Interferometry – 102

INTERMETALLICS
Rare-earth Transition-Metal Intermetallics: Structure-Bonding-Property Relationships – 48

INTERNAL COMBUSTION ENGINES
Cost-Effective Reciprocating Engine Emissions Control and Monitoring for E&P Field and Gatherings Engines. Report 14. Technical Report, April 1, 2006-June 30, 2006 – 114

Spark Ignition Aircraft Engine Endurance Test of Aviation-Grade Ethanol 85 – 37

INTERNAL WAVES
Nonhydrostatic Numerical Investigations of Oscillating Flow over Sills: Generation of Internal Tides and Solitary Waves – 234

INTERNATIONAL COOPERATION
Review of Cranked-Arrow Wing Aerodynamics Project: Its International Aeronautical Community Role – 13

INTERNATIONAL LAW
Information Warfare and International Law – 315

INTERNATIONAL RELATIONS
A Need to Know: The Role of Air Force Reconnaissance in War Planning, 1945-1953 – 17

INTERNATIONAL SPACE STATION
A Dynamic/Anisotropic Low Earth Orbit (LEO) Ionizing Radiation Model – 334

Orbiter Gap Filler Bending Model for Re-entry – 33

Organization, Management and Function of International Space Station (ISS) Multilateral Medical Operations – 180

INTERNETS
Exploiting Secondary Sources for Unsupervised Record Linkage – 307

Hierarchical Role-based Viewing for Multi-level Information Security in Collaborative CAD – 307

Softswitch Architecture Remodelling for New Generation IP Multimedia Subsystem Environment – 79

INTEROPERABILITY
JPEG 2000 and WSQ Image Compression Interoperability – 186

ORA: Organization Risk Analyzer – 210

INTERPLANETARY MAGNETIC FIELDS
Alfven Waves in the Solar Wind, Magnetosheath, and Outer Magnetosphere – 333

INTERPOLATION
Gappy Data: To Krig or Not To Krig – 242

Model Validation and Spatial Interpolation by Combining Observations with Outputs from Numerical Models via Bayesian Melding – 244

Multiresolution Optimal Interpolation and Statistical Analysis of Topex/Poseidon Satellite Altimetry – 238

On Interpolation and Integration in Finite-Dimensional Spaces of Bounded Functions – 233

INTERPROCESSOR COMMUNICATION
Exploring Speech-Enabled Dialogue with the Galaxy Communicator Infrastructure – 217

INTERROGATION
The Database as Model: A Metatheoretic Approach – 314

INTERSTELLAR RADIATION
Inverse Compton Emission from Galactic Supernova Remnants: Effect of the Interstellar Radiation Field – 322

INTRUSION DETECTION (COMPUTERS)
Intrusion Detection System Requirements. A Capabilities Description in Terms of the Network Monitoring and Assessment Module of CSAP21 – 215

Intrusion Reaction: Recommendations for Obtaining Reaction Capabilities – 215

INVARIANCE
A Detailed Look at Scale and Translation Invariance in a Hierarchical Neural Model of Visual Object Recognition – 224

New Developments in Measurements of CP Violation – 275

INVENTORIES

Inventory of Sources and Environmental Releases of Dioxin-Like Compounds in the USA for the Years 1987, 1995, and 2000 – 139

Phase I Cultural Resources Survey and Archeological Inventory of a Proposed 1.12 ha (2.87 ac) Borrow Pit and an Associated Access Road, Ascension Parish, Louisiana – 126

Toxic Substances Control Act (TSCA): ASCII Text Data, January 2007, PMN Number to EPA Accession Number Link (Raw Data on CD-ROM) – 41

INVENTORY CONTROLS

ARN II Program, Final Technical Report – 218

INVERSE SCATTERING

Inverse Compton Scattering on Solar Photons, Heliospheric Modulation, and Neutrino Astrophysics – 323

Layer by Layer Reconstruction Methods for the Earth Resistivity from Direct Current Measurements – 236

INVERSIONS

A Multiscale Approach to Solving One Dimensional Inverse Problems – 187

Inversion of Generalized Parabolic Projections – 235

Simultaneous Inversion of Velocity and Density Profiles – 236

Simultaneous Linearized Inversion of Velocity and Density Profiles for Multidimensional Acoustic Media – 282

Time-Lapse Seismic Modeling and Inversion Modeling and Inversion of CO2 Saturation for Sequestration and Enhanced Oil Recovery – 135

Variable Background Born Inversion by Wavefield Backpropagation – 188

Wave Based Inversion and Imaging for the Optical Quadrature Microscope – 290

INVERTERS

Integrated Inverter for Driving Multiple Electric Machines – 89

IODIDES

Lu(sup 1)xI(sup 3):Ce(sup x): A Scintillator for Gamma Ray Spectroscopy and Time-Of Flight Pet – 266

ION BEAMS

Ion Motion in the Adiabatic Focuser – 296

New Simulation Capabilities of Electron Clouds in Ion Beams with Large Tune Depression – 279

ION MOTION

Ion Motion in the Adiabatic Focuser – 296

ION PROPULSION

Heavy Ion Propulsion in the Megadalton Range – 36

IONIZING RADIATION

A Dynamic/Anisotropic Low Earth Orbit (LEO) Ionizing Radiation Model – 334

The Role of Dosimetry in High-Quality EMI Risk Assessment – 140

IONS

Ion Effects in the Electron Damping Ring of the International Linear Collider – 295

Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

IRAQ

A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

IRRADIANCE

Model Calculations of Solar Spectral Irradiance in the 3.7 Micron Band for Earth Remote Sensing Applications – 141

IRRADIATION

Effects of Irradiation with Different Dose Rates of X-ray on Mouse Immune System – 177

Fuel-Cladding Interaction Layers in Irradiated U-Zr and U-Pu Zr Fuel Elements – 40

Post Irradiation Evaluation of Thermal Control Coatings and Solid Lubricants to Support Fission Surface Power Systems – 114

ITERATION

A Distributed and Iterative Method for Square Root Filtering in Space-Time Estimation – 191

Iterative Structure Discovery in Graph-Based Data – 249

Monte Carlo Evaluation of an Iterative Technique for the Design of Observer Field Tests – 187

JAMES WEBB SPACE TELESCOPE

MEMS Microshutter for James Webb Space Telescope – 319

JANUS

Solid-Density Plasma Characterization with X-Ray Scattering on the 200-J Janus Laser – 271

JOINTS (JUNCTIONS)

Bearing-Load Modeling and Analysis Study for Mechanically Connected Structures – 116

JOSEPHSON JUNCTIONS

A Multi-Josephson Junction Qubit – 298

Josephson Junction Triangular Prism Qubits Coupled to a Resonant LC Bus: Qubits and Gates for a Holonomic Quantum Computer – 96

JOULE-THOMSON EFFECT

Electrothermal Desorption of CWA Simulants from Activated Carbon Cloth – 39

JP-5 JET FUEL

Theoretical Considerations Governing the Dehydration of Fuels by Gas Blowing – 44

JP-8 JET FUEL

Biodegradability of JP-8 Fuel in the Aquatic Environment – 63

Pharmacokinetic Modeling of JP-8 Jet Fuel Components: II. A Conceptual Framework – 63

KANSAS

Chemical Analyses of Water Samples From the Picher Mining Area, Northeast Oklahoma and Southeast Kansas – 38

KERNEL FUNCTIONS

The Normal Kernel Coupler: An Adaptive Markov Chain Monte Carlo Method for Efficiently Sampling From Multi-Modal Distributions – 232

KINEMATICS

Scalable Solutions for Interactive Virtual Humans that can Manipulate Objects – 202

KLYSTRONS

Amplitude Linearizers for PEP-II 1.2 MW Klystrons and LLRF Systems – 294

KNOWLEDGE BASED SYSTEMS

Enhancing Incremental Learning Processes With Knowledge-Based Systems – 312

Methods, Knowledge Support, and Experimental Tools for Modeling – 209

KNOWLEDGE REPRESENTATION

A Storage System for Scalable Knowledge Representation – 310

Semantic Web Rule Languages – 213

Using Human Systems Integration and Knowledge Engineering to Define and Design Anti-Terrorism/Force Protection Systems and Solutions – 183

KREEP

Sm-Nd Isotopic Systematics of Troctolite 76335 – 330

KRIGING

Gappy Data: To Krig or Not To Krig – 242

LABORATORIES

Biological Restoration of Major Transportation Facilities Domestic Demonstration and Application Project (DDAP): Technology Develop(ment aat Sandia National Laboratories – 60

LABOR

Adaptive Division of Labor in Large-Scale Minimalist Multi-Robot Systems – 224

LAGRANGIAN FUNCTION

A Technique for Speeding Up the Solution of the Lagrangean Dual – 192

Topological Twisted Sigma Model with H-Flux Revisited – 267

LAMINATES

Lamination Cooling System Formation Methods – 90

LANDING SITES
Numerical Skip-Entry Guidance – 32
Seismic Measurement of Concrete Strength Properties – 27

LANGUAGE PROGRAMMING
A Media-Independent Content Language for Integrated Text and Graphics Generation – 193
Introduction to SPARK. Version 0.3 – 204
QLISP: A Language for the Interactive Development of Complex Systems – 204
The DINO Parallel Programming Language – 206

LANGUAGES
Semantic Web Rule Languages – 213
Tasks, Domains, and Languages – 308
The Database as Model: A Metatheoretic Approach – 314

LANTHANUM
Very Fast Doped LaBr(sup 3) Scintillators and Time-Of-Flight Pet – 266

LASER APPLICATIONS
A Multi-Scale Modeling of Laser Cladding Process (Preprint) – 112

LASER BEAMS
Re-Evaluating Satellite Solar Power Systems for Earth – 130

LASER DRILLING
Investigation of Temporal Contrast Effects in Femtosecond Pulse Laser Micromachining of Metals – 291

LASER INDUCED FLUORESCENCE
Fluorescence Visualization of Hypersonic Flow Past Triangular and Rectangular Boundary-layer Trips – 4

LASER MACHINING
Investigation of Temporal Contrast Effects in Femtosecond Pulse Laser Micromachining of Metals – 291

LASER MODE LOCKING
Dispersion Management in a Harmonically Mode-Locked Fiber Soliton Laser – 111

LASER PLASMAS
High Magnetic Field Generation for Laser-Plasma Experiments – 270

LASER TARGETS
Analysis Procedures for Double-Shell Target Concentricity and Wall Thickness – 271

LASERS
A Multi-Scale Modeling of Laser Cladding Process (Preprint) – 112
Dispersion Management in a Harmonically Mode-Locked Fiber Soliton Laser – 111
FY 2005 Quantum Cascade Laser Alignment System. Final Report – 289
High Magnetic Field Generation for Laser-Plasma Experiments – 270
Improved Temperature Characteristics in Quantum Dot Lasers with Indirect-Bandgap Barriers – 97
Initial Demonstration of Mercury Wavefront Correction System – 287
Laser-Based Spectroscopic Detection Techniques – 288
Method of Defining Features on Materials with a Femtosecond Laser – 288
Multi Dimensional Investigation of Laser Conditioning in KDP and DKDP Crystals – 290
Semiconductor 1.7 W Volume Bragg Laser with Divergence Close to a Diffraction Limit – 111
Solid-Density Plasma Characterization with X-Ray Scattering on the 200-J Janus Laser – 271
Summary of Recent Damage-Initiation Experiments on KDP Crystals – 291
The Effects of Laser Peening and Shot Peening on Mechanical Properties in Friction Stir Welded 7075-T7351 Aluminum – 54
Time-Resolved Soft X-Ray Imaging (SXRI) Diagnostic for Use at the NIF and OMEGA Lasers – 270

LATERAL CONTROL
Tailored Excitation for Frequency Response Measurement Applied to the X-43A Flight Vehicle – 25

LAUNCH VEHICLES
Materials Development for Hypersonic Flight Vehicles – 45

LAW (JURISPRUDENCE)
Developments in the National Incident-Based Reporting System (NIBRS) (Updated July 2006) – 304
Foundations in the Law: Classic Cases in Medical Ethics – 159

LAWS
Disclosure of Confidential Child Abuse and Neglect: Summary of State Laws – 196
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Amendments to the Fire Protection and Life Safety Provisions of the New York City Building Code by Local Laws Adopted While World Trade Center 1, 2, and 7 Were in Use. NIST NCSTAR 1-1G – 121

LAYOUTS
Generating Efficient Layouts from Optimized MOS Circuit Schematics – 82
Graph-based Representations and Coupled Verification of VLSI Schematics and Layouts – 95
Procedural Layout of a High-Speed Floating-Point Arithmetic Unit – 94

LEAD (METAL)
Supplemental Release Limits for the Directed Reuse of Steel in Road Barriers and Lead in Shielding Products by the Department of Energy – 318

LEADERSHIP
Effective Teamwork: The EVA NBL Experience – 299
Human Dimensions of Strategic Leadership: A Selected Bibliography – 299

LEAKAGE
Leakage from Geologic Storage Reservoirs of CO2 – 137

LEARNING
Active Learning Using Arbitrary Binary Valued Queries – 187
Enhancing Incremental Learning Processes With Knowledge-Based Systems – 312
Statistical Learning: Stability is Sufficient for Generalization and Necessary and Sufficient for Consistency of Empirical Risk Minimization – 256

LENGTH
Bunch Length Measurements at the JLab FEL Using Coherent Transition and Synchrotron Radiation – 295

LENS ANTENNAS
Metamaterial Scanning Lens Antenna Systems and Methods – 71

LENSES
Metamaterial Scanning Lens Antenna Systems and Methods – 71

LEPTONS
Recent tau Physics Studies at BABAR – 263

LESIONS
Optical Spectroscopy and Multiphoton Imaging for the Diagnosis and Characterization of Hyperplasias in the Mouse Mammary – 172

LETHALITY
Survivability: A Markov Process – 247

LEUKOCYTES
Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 165

LIABILITIES
Risk Management and Medical Liability: A Manual for Indian Health Service and Tribal Health Care Professionals. Second Edition – 304

LIAPUNOV FUNCTIONS
Lyapunov Exponents for Filtering Problems – 192

LIBRARIES
Concurrent Single-Executable CCSM with MPH Library – 196
HYDRA: A Java Library for Markov Chain Monte Carlo – 244
Standardization of Object Oriented Extensions to Vector Signal and Image Processing Library (VSIPL) – 209

LIFE (DURABILITY)

Incorporation of Half-Cycle Theory Into Ko Aging Theory for Aerostructural Flight-Life Predictions – 122

LIFE SCIENCES

Exercise and Bone Density: Meta-Analysis – 151

Making Lipid Membranes Rough, Tough, and Ready to Hit the Road – 156

Monitoring Cancer Oxygenation Changes Induced by Ultrasound – 150

Neural Protein Synuclein (SNCG) in Breast Cancer Progression – 149

Showcase for Biotechnology 2005 – 149

The Role of CRELD1 Isoform 9b in the Pathogenesis of Breast Cancer – 150

LIFE SPAN

Increasing Breast Cancer Surveillance Among African American Breast Cancer Survivors – 150

LIFE SUPPORT SYSTEMS

Application of NASA's Advanced Life Support Technologies in Polar Regions – 148

Exploration Life Support Technology Development Challenges – 327

LIFTOFF (LAUNCHING)

Crew Exploration Vehicle Ascent Abort Coverage Analysis – 31

LIFT

High-Lift System for a Supercritical Airfoil: Simplified by Active Flow Control – 15

LIGHT AMPLIFIERS

Optical Regenerative Amplifier for Binary Phase Shift-Keying Signals – 289

LIGHT BEAMS

Large Mode-Area Microstructure Optical Fiber – 90

LIGHT SOURCES

SLS Optics Beamline – 265

Vertical Beam Size Control in TLS and TPS – 275

LIGHT (VISIBLE RADIATION)

Carbon Nanotube Based Light Sensor – 78

LINEAR ACCELERATORS

Commissioning of the Digital LLRF for CEBAF Injector/Separator – 269

Design and Testing of Gproto bunch-by-bunch Signal Processor – 294

Direct Measurement of Geometric and Resistive Wakefields in Tapered Collimators for the International Linear Collider – 267

High Gradient Operation with the CEBAF Upgrade RF Control System – 268

ILC Linac R and D at SLAC – 276

Jefferson Lab's Distributed Data Acquisition – 296

Neutron Resonance Parameters of 238U and the Calculated Cross Sections from the Reich-Moore Analysis of Experimental Data in the Neutron Enrgy Range from O keV to 20 keV – 293

Physics at the Thomas Jefferson National Accelerator Facility – 280

Proceedings of the Oak Ridge Electron Linear Accelerator (ORELA) Workshop – 323

Projected Life of the SLAC Linac Braze Joints: Braze Integrity and Corrosion of Cooling Water Hardware on Accelerator Sections – 278

Recent Developments in SRF Cavity Science and Performance – 273

SABER Optical Design – 264

SNS Cryogenic Systems Commissioning – 295

Spin Rotation and Energy Compression in the ILC Linac-to-Ring Beamline – 276

LINEAR OPERATORS

Is Validity of the Convolution Theorem Questionable? – 78

LINEAR PROGRAMMING

A Technique for Speeding Up the Solution of the Lagrangean Dual – 192

The Flores Mixed Integer Linear Programming Model for the Optimal Response of Hydro Cascades in the Electricity Spot Market – 81

LINEAR SYSTEMS

Analysis, Estimation, and Control for Perturbed and Singular Systems and for Systems Subject to Discrete Events – 250

Asymptotic Orders of Reachability in Perturbed Linear Systems – 189

Choosing the Link Function and Accounting for Link Uncertainty in Generalized Linear Models using Bayes Factors – 192

LINEARIZATION

Feedback Linearized Aircraft Control Using Dynamic Cell Structure – 25

LINGUISTICS

Experiments in Evaluating Interactive Spoken Language Systems – 316

Statistical Alignment Models in Machine Translation from Slovenian to English – 186

Stressed and Unstressed Pronouns: Complementary Preferences – 226

Summarization-Inspired Temporal-Relation Extraction: Tense-Pair Templates and Treebank-3 Analysis – 253

The Rate of Progress in Natural Language Processing – 316

LINKAGES

Exploiting Secondary Sources for Unsupervised Record Linkage – 307

LINKS

Choosing the Link Function and Accounting for Link Uncertainty in Generalized Linear Models using Bayes Factors – 192

LIPIDS

Making Lipid Membranes Rough, Tough, and Ready to Hit the Road – 156

Using Genetically Engineered Mice to Probe the Role of Bioactive Lipids in Prostate Carcinogenesis – 157

Weight Measurements and Standards for Soldiers – 165

LIQUID CRYSTALS

Dynamical Study of Guest-Host Orientational Interaction in Liquid Crystalline Materials – 51

Extreme Nonlinear Optics With Liquid Crystals – 287

LIQUID HYDROGEN

New High Capacity Getter for Vacuum Insulated Mobile Liquid Hydrogen Storage Systems – 105

LIQUID NITROGEN

Fiber Optic Raman Sensor to Monitor Concentration Ratio of Nitrogen and Oxygen in a Cryogenic Mixture – 286

LIQUID OXYGEN

Fiber Optic Raman Sensor to Monitor Concentration Ratio of Nitrogen and Oxygen in a Cryogenic Mixture – 286

LIQUIDS

Ionic Solvents Used in Ionic Polymer Transducers, Sensors and Actuators – 41

LISP (PROGRAMMING LANGUAGE)

LIFT - The LIsp Framework for Testing – 211

LITHIUM BATTERIES

Carbon Materials Metal/Metal Oxide Nanoparticle Composite and Battery Anode Composed of the Same – 44

LITHIUM ISOTOPES

Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 325

The Origin of Dark Inclusions in Allende: New Evidence from Lithium Isotopes – 330

LOADS (FORCES)

Loads Induced in the Lumbar Spine of Seated Restrained Humans by Sideward (+Gy) Impact – 181

Statistical Loads Data for the Boeing 777-200ER Aircraft in Commercial Operations – 15

Using Motion-Base Simulation to Guide Future Force Systems Design – 113

LOCAL AREA NETWORKS

A Near-Optimum Channel Access Protocol Based on Incremental Collision Resolution and Distributed Transmission Queues – 217

The Throughput of Wavelength Routing Networks – 83

LOCOMOTION

A Hypothetical Perspective on the Relative Contributions of Strategic and Adaptive Control Mechanisms in Plastic Recalibration of Locomotor Heading Direction – 155

Locomotor Dysfunction after Spaceflight: Characterization and Countermeasure Development – 151

The Bekker Model Analysis for Small Robotic Vehicles – 229

Towards a Factored Analysis of Legged Locomotion Models – 229

LOGIC CIRCUITS

Procedural Layout of a High-Speed Floating-Point Arithmetic Unit – 94

LOGISTICS MANAGEMENT

Reverse Logistics: Has the Implementation of Reverse Logistics Met the Objectives of Air Mobility Command – 210

LOGISTICS

Reverse Logistics: Has the Implementation of Reverse Logistics Met the Objectives of Air Mobility Command – 210

The Development of a Logistical Body of Knowledge for the Department of Defense – 313

LOOP ANTENNAS

VLF Signal Reception Capability of Three Experimental Crossed-Loop Antennas – 84

LOOPS

Geometric Variational Methods for Controlled Active Vision – 223

LOSSES

Magnetization Losses in Multifilament Coated Superconductors (Postprint) – 281

Verification Test Problems for the Calculation of Probability of Loss of Assured Safety in Temperature-Dependent Systems with Multiple Weak and Strong Links – 190

LOW CURRENTS

A Noise Theory for the Magnetron. I. The Temperature Limited Low Current Densit Magnetron – 83

LOW DENSITY MATERIALS

Development of Low Density CaMg-Al-Based Bulk Metallic Glasses (Preprint) – 55

LOW EARTH ORBITS

A Dynamic/Anisotropic Low Earth Orbit (LEO) Ionizing Radiation Model – 334

LOW SPEED

Rotating Rake Mode Measurements Over Passive Treatment in a Ducted Fan – 283

LOW TURBULENCE

High-Lift System for a Supercritical Airfoil: Simplified by Active Flow Control – 15

LOW VOLTAGE

Low-Voltage Infrared Free-Electron Lasers Based on Gyrotron-Powered RF Wigglers – 111

LOWER ATMOSPHERE

Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences. Synthesis and Assessment Product 1.1 – 143

LUBRICANTS

An Introduction to Heavy-Duty Diesel Engine Frictional Losses and Lubricant Properties Affecting Fuel Economy - Part 1 – 65

Application of Carbon Based Nano-Materials to Aeronautics and Space Lubrication – 113

Characterization of Lubricants on Ball Bearings by FT-IR Using an Integrating Sphere – 52

Molybdenum Disulfide as a Lubricant And Catalyst in Adaptive Nanocomposite Coatings (Preprint) – 53

LUBRICATION

Application of Carbon Based Nano-Materials to Aeronautics and Space Lubrication – 114

LUMBAR REGION

Loads Induced in the Lumbar Spine of Seated Restrained Humans by Sideward (+Gy) Impact – 181

LUMINOSITY

Amplitude Linearizers for PEP-II 1.2 MW Klystrons and LLRF Systems – 294

Black Hole Spectral States and Physical Connections – 322

Luminosity Function of Faint Globular Clusters in M87 – 324

Monitoring of Interaction-Point Parameters Using the 3-Dimensional Luminosity Distribution Measured at Pep-II – 263

LUNAR LANDING

Powered Descent Trajectory Guidance and Some Considerations for Human Lunar Landing – 331

LUNAR ORBITS

Radiation and Plasma Environments for Lunar Missions – 333

LUNAR SURFACE

Electron Beam Freeform Fabrication in the Space Environment – 319

Sm-Nd and Rb-Sr Ages for MIL 05035: Implications for Surface and Mantle Sources – 331

LUNGS

Gene Environment Interactions in Women With Breast and Secondary Lung Cancer – 150

LUTETIUM

Lu(sup 1)xI(sup 3):Ce(sup x): A Scintillator for Gamma Ray Spectroscopy and Time-Of Flight Pet – 266

LYMPHATIC SYSTEM

Lymphedema Prophylaxis Utilizing Perioperative Education – 159

LYMPHOCYTES

Are Anti-Inflammatory Lymphocytes Able to Induce Remission of Breast Cancer – 150

Spatial-Temporal Mapping of the T Cell Receptor NF-kappaB Signaling Pathway – 152

MACHINE LEARNING

A Framework for Learning Declarative Structure – 239

Digital Learning Network Education Events of NASA's Extreme Environments Mission Operations – 331

Exploiting Secondary Sources for Unsupervised Record Linkage – 307

Face Recognition with Support Vector Machines: Global versus Component-Based Approach – 205

Geneways for Biocomputing – 309

Learning and Recognition in Natural Environments – 227

Statistical Comparisons of Classifiers in Machine Learning – 79

MACHINE TRANSLATION

Fast Decoding and Optimal Decoding for Machine Translation – 240

Statistical Alignment Models in Machine Translation from Slovenian to English – 186

UMass at TREC 2002: Cross Language and Novelty Tracks – 228

MAGNESIUM ALLOYS

Precipitation in Al-Zn-Mg-Cu Alloys Modified With Sc and Zr During Aging (Preprint) – 55

MAGNESIUM

Composition Range and Glass Forming Ability of Ternary Ca-Mg-Cu Bulk Metallic Glasses (Preprint) – 55

Development of Low Density CaMg-Al-Based Bulk Metallic Glasses (Preprint) – 55

Sm-Nd Isotopic Systematics of Troctolite 76335 – 330

MAGNETIC BEARINGS

A Bearingless Switched-Reluctance Motor for High Specific Power Applications – 23

MAGNETIC COOLING

Nature of the Distinctive Microscopic Features in R5(SIxGe1-x)4 Magnetic Refrigeration Materials – 39

MAGNETIC FIELD CONFIGURATIONS

Alfven Waves in the Solar Wind, Magnetosheath, and Outer Magnetosphere – 333

MAGNETIC FIELD RECONNECTION

How Does Collisionless Magnetic Reconnection Work in the Presence of a Guide Magnetic Field? – 94

MAGNETIC FIELDS

High Magnetic Field Generation for Laser-Plasma Experiments – 270

Magnetoelectric Multilayer Composites for Field Conversion – 91

MAGNETIC FLUX

Trains of Magnetic Holes and Magnetic Humps in the Heliosheath – 326

MAGNETIC MATERIALS

Nature of the Distinctive Microscopic Features in R5(SIxGe1-x)4 Magnetic Refrigeration Materials – 39

MAGNETIC RESONANCE

Analysis of fMRI Data by Blind Separation into Independent Spatial Components – 169

MAGNETIC STORAGE

Bias-Adjusted Giant Magnetoresistive (GMR) Devices for Magnetic Random Access Memory (MRAM) Applications – 70

MAGNETIZATION

Analysis of the Magnetized Friction Force – 262

Magnetization Losses in Multifilament Coated Superconductors (Postprint) – 280

MAGNETOHYDRODYNAMIC WAVES

Alfven Waves in the Solar Wind, Magnetosheath, and Outer Magnetosphere – 333

MAGNETORESISTIVITY

Bias-Adjusted Giant Magnetoresistive (GMR) Devices for Magnetic Random Access Memory (MRAM) Applications – 70

MAGNETOSHEATH

Alfven Waves in the Solar Wind, Magnetosheath, and Outer Magnetosphere – 333

MAGNETOSPHERE-IONOSPHERE COUPLING

Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

MAGNETRONS

A Noise Theory for the Magnetron. I. The Temperature Limited Low Current Densit Magnetron – 83

MAGNETS

High Field Solenoid Magnets for Muon Cooling – 261

Perfect Electrode to Suppress Secondary Electrons Inside the Magnets – 278

MAINTAINABILITY

Energy and Utilities Readiness for the Army Industrial Activities – 133

Process Improvement at the Aircraft Intermediate Maintenance Detachment (AIMD) at Naval Air Station Whidbey Island – 5

MAINTENANCE

A Methodology for Improving the Shipyard Planning Process: Using KVA Analysis, Risk Simulation and Strategic Real Options – 100

A Summary of Unmanned Aircraft Accident/Incident Data: Human Factors Implications – 10

Aircraft Fuel Cell Repair Equipment (AFCRE) – 17

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design, Construction, and Maintenance of Structural and Life Safety Systems. NIST NCSTAR 1-1 – 299

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Maintenance and Modifications to Structural Systems. NIST NCSTAR 1-1C. (Appendices not included) – 117

Process Improvement at the Aircraft Intermediate Maintenance Detachment (AIMD) at Naval Air Station Whidbey Island – 5

The Development of a Business Case Analysis for the Acquisition of the Agile Rapid Global Combat Support System Used for the USA Marine Corps' Ground Equipment – 66

The Maintenance Costs of Aging Aircraft: Insights from Commercial Aviation – 27

MALES

Facilitating Treatment Decision Making, Adjustment, and Coping in Men Newly Diagnosed with Prostate Cancer. Addendum – 164

Inhibitory Ah Receptor-Androgen Receptor Crosstalk in Prostate Cancer – 170

Protective Effects of Vitamin E on Injury to Male Reproductive Function in Tail-suspended Rats – 179

MAMMARY GLANDS

Antineoplastic Efficacy of Novel Polyamine Analogues in Human Breast Cancer – 166

Breast Cancer Prevention by Inducing Apoptosis in DCIS Using Breast Ductal Lavage – 167

Central Leptin Gene Therapy to Reduce Breast Cancer Risk Factors – 166

Characterization of Genetic Modifiers of Estrogen-Induced Mammary Cancer – 154

Dysregulation of RNA Interference in Breast Cancer – 167

Effect of Chimaerins, Novel Receptors for Phorbol Esters, on Breast Cancer Cell Proliferation and Cell Cycle Progression – 165

Estrogen-Induced Depurination of DNA: A Novel Target for Breast Cancer Prevention – 173

Glycopetide-Based Immunotherapy for Prophylaxis and Treatment of Mammary Adenocarcinomas – 149

Identification of the Downstream Promoter Targets of Smad Tumor Suppressors in Human Breast Cancer Cells – 160

Miniature and Molecularly Specific Optical Screening Technologies for Breast Cancer – 161

Novel Angiogenic Domains: Use in Identifying Unique Transforming and Tumor Promoting Pathways in Human Breast Cancer – 162

Nuclear Receptor Interactions in Breast Cancer: The Role of Kinase Signaling Pathways – 172

Optical Spectroscopy and Multiphoton Imaging for the Diagnosis and Characterization of Hyperplasias in the Mouse Mammary – 172

Prostate Derived Ets Factor, an Immunogenic Breast Cancer Antigen – 166

Randomized Trial of Neuroprotective Effects of Erythropoietin in Patients Receiving Adjuvant Chemotherapy for Breast Cancer: Position Emission Tomography and NE – 171

Rational Design of Regulators of Programmed Cell Death in Human Breast Cancer – 163

Soy and Tamoxifen for Breast Cancer Prevention in High Risk Pre-Menopausal Women – 171

The Effect of a Home-Based Walking Intervention on Quality of Life, Body Composition, and Estrogen Metabolism in Postmenopausal Breast Cancer Survivors – 169

The Role of AhR in Breast Cancer Development – 166

MAN MACHINE SYSTEMS

Simulation Study on Performance of Control by Man and Machine in the Stage of Final Approaching for Rendezvous and Docking – 175

MANAGEMENT PLANNING

Defense Infrastructure: Continuing Challenges in Managing DOD Lodging Programs as Army Moves to Privatize Its Program – 123

Next Generation Air Transportation System 2005 Progress Report – 7

Organization, Management and Function of International Space Station (ISS) Multilateral Medical Operations – 180

MANNED SPACE FLIGHT

Effects of Microgravity on Human Spatial Orientation in Space Flight – 175

Powered Descent Trajectory Guidance and Some Considerations for Human Lunar Landing – 331

Research on ECG Denoising during Spaceflight – 177

MANNED SPACECRAFT

Into the Unknown Together. The DOD, NASA, and Early Spaceflight – 32

MANUALS

Risk Management and Medical Liability: A Manual for Indian Health Service and Tribal Health Care Professionals. Second Edition – 304

User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 208

MANUFACTURING

Accelerating PV Cost Effectiveness Through Systems Design, Engineering, and Quality Assurance. Phase 1 Annual Technical Report, November 4, 2004-November 3, 2005 – 130

MAPPING

Applying Perceptually Driven Cognitive Mapping to Virtual Urban Environments – 229

BSAR Computational Analysis and Proposed Mapping. Revision 1 – 238

Defense Display Strategy and Roadmaps – 335

New Hyperspectral Discrimination Measure for Spectral Characterization – 228

MARINER MARK 2 SPACECRAFT

Titan Orbiter with Aerorover Mission (TOAM) – 319

MARKET RESEARCH

Evolution of the U.S. Housing Finance System: A Historical Survey and Lessons for Emerging Mortgage Markets – 305

Modeling Stock Order Flows and Learning Market-Making from Data – 204

MARKING

How to Prevent Type-Flaw Guessing Attacks on Password Protocols – 216

MARKOV CHAINS

Bilinear Mixed Effects Models for Dyadic Data – 246

HYDRA: A Java Library for Markov Chain Monte Carlo – 244

The Normal Kernel Coupler: An Adaptive Markov Chain Monte Carlo Method for Efficiently Sampling From Multi-Modal Distributions – 232

MARKOV PROCESSES

HYDRA: A Java Library for Markov Chain Monte Carlo – 244

Multiscale Representations of Markov Random Fields – 243

Robust Estimation of cDNA Microarray Intensities with Replicates – 245

Survivability: A Markov Process – 247

MARS CRATERS

Layered Sediments, Rampart Craters, and Potential Fluvio-Lacustrine Activity in S.W. Arabia Terra, Mars: Support for a History of Aqueous Conditions – 332

MARS EXPLORATION

Lessons Learned From Seven Space Shuttle Missions – 33

MARS MISSIONS

Autonomous Aerobraking Using Thermal Response Surface Analysis – 34

MARS (PLANET)

Ar-39-Ar-40 Ages of Two Nakhlites, MIL03346 and Y000593: A Detailed Analysis – 327

Rb-Sr and Sm-Nd Isotopic Studies of Martian Depleted Shergottes SaU 094/005 – 327

MARS RECONNAISSANCE ORBITER

Probabilistic Thermal Analysis During Mars Reconnaissance Orbiter Aerobraking – 105

MARS SURFACE

Layered Sediments, Rampart Craters, and Potential Fluvio-Lacustrine Activity in S.W. Arabia Terra, Mars: Support for a History of Aqueous Conditions – 332

MASS RATIOS

Not So Rare Earth? New Developments in Understanding the Origin of the Earth and Moon – 125

MASS

Evolution of Intermediate and Low Mass Binary Systems – 333

MATERIALS SCIENCE

Synthesis of Multifunctional Materials – 335

MATHEMATICAL MODELS

A Detailed Look at Scale and Translation Invariance in a Hierarchical Neural Model of Visual Object Recognition – 224

A Probabilistic Model for Uncertain Problem Solving – 189

Adaptive Bayesian Signal Reconstruction with A Priori Model Implementation and Synthetic Examples for X-Ray Crystallography – 242

Analysis of Flicker Levels in the Slovenian Transmission Network – 81

Analysis of Industrial Power Networks – 80

Analysis of the Magnetized Friction Force – 262

Analytical Verification of Undesirable Properties of Direct Model Reference Adaptive Control Algorithms – 250

Bearing-Load Modeling and Analysis Study for Mechanically Connected Structures – 116

Bilinear Mixed Effects Models for Dyadic Data – 245

Cost Valuation: A Model for Comparing Dissimilar Aircraft Platforms – 18

Cross-Lingual Lexical Triggers in Statistical Language Modeling – 244

Electrotechnical Review, Volume 73, No. 5 – 78

Evaluating a Computational Model of Emotion – 233

Fast Search Algorithms for Connected Phone Recognition Using the Stochastic Segment Model – 235

Incremental Model-Based Clustering for Large Datasets With Small Clusters – 254

Investigating Shape Representation in Area V4 with HMAX: Orientation and Grating Selectivities – 224

Is Validity of the Convolution Theorem Questionable? – 77

Mitigation Theory: An Integrated Approach – 249

Model Reduction of Systems with Localized Nonlinearities – 198

Model Validation and Spatial Interpolation by Combining Observations with Outputs from Numerical Models via Bayesian Melding – 244

Model-driven Architecture and Its Impact on the Software Development Process – 81

Modeling, Analysis, Simulation, and Synthesis of Biomolecular Networks – 162

Modeling and Analysis of Facility Systems for A Hybrid Materials Test Program – 62

Modeling the Observed Solar Cycle Variations of the Quasi-biennial Oscillation (QBO): Amplification by Wave Forcing – 144

Natural Calcium Isotopic Composition of Urine as a Marker of Bone Mineral Balance – 155

Observability of Discrete Event Dynamic Systems. Revision – 183

On the Design of Information-Processing and Decisionmaking Organizations – 251

Size Selection Initiation Model Extended to Include Shape and Random Factors – 197

Some Issues at Sampled-Data Identification and Conversion of the Identified Models into the Continuous-Time Domain – 75

Statistical Alignment Models in Machine Translation from Slovenian to English – 186

Structural Uncertainties in Numerical Induction Models – 240

Temporal Analysis of Social Networks Using Three-Way DEDICOM – 198

Topological Twisted Sigma Model with H-Flux Revisited – 267

Training Tree Transducers – 230

MATRICES (CIRCUITS)

All-Optical Controllable Photonic Switch – 290

MATRICES (MATHEMATICS)

Diagonal Representation of Certain Matrices – 233

Measurement of the CKM Matrix Element Vcb and Vub at the B-Factories – 259

MAXIMUM LIKELIHOOD ESTIMATES
Risk Bounds for Mixture Density Estimation – 246

MAXWELL EQUATION
The Inverse Source Problem for Maxwell's Equations – 232

MEAN
Can One Decide the Type of the Mean from the Empirical Measure? – 243

MEASURE AND INTEGRATION
Comparison of Fixed and Variable Time Step Trajectory Integration Methods for Cislunar Trajectories – 231

MEASUREMENT
Bayesian Inference for Color Image Quantization via Model-Based Clustering Trees – 191

Compression and Instrumented Indentation Measurements on Biomimetic Polymers – 40

Lattice Approximation in the Stochastic Quantization of (04)2 Fields – 237

Markov Random Fields, Stochastic Quantization and Image Analysis – 243

STRATA: Observer-based Measurement Agent Research Support – 64

Transient Sweat Rate Calculation from Humidity Measurements Under Clothing – 297

MEASURING INSTRUMENTS
Gravitational Gauge Mediation – 276

Powder Handling Device for Analytical Instruments – 112

MECHANICAL DEVICES
Powder Handling Device for Analytical Instruments – 113

Responding to Mechanical Antigravity – 37

MECHANICAL DRIVES
Fractional-Slot Surface Mounted PM Motors with Concentrated Windings for HEV Traction Drives – 85

MECHANICAL PROPERTIES
Bearing-Load Modeling and Analysis Study for Mechanically Connected Structures – 116

Development of GRCop-84 for Rocket Engine Applications – 56

The Effects of Laser Peening and Shot Peening on Mechanical Properties in Friction Stir Welded 7075-T7351 Aluminum – 54

MEDICAL ELECTRONICS
Space Medicine and Medical Engineering, Volume 19, No. 5 – 174

MEDICAL SCIENCE
A Medical Research and Evaluation Facility (MREF) and Studies Supporting the Medical Chemical Defense Program – 167

Foundations in the Law: Classic Cases in Medical Ethics – 159

MEDICAL SERVICES
Foundations in the Law: Classic Cases in Medical Ethics – 159

Implementation of the Asthma Practice Guideline in the Army Medical Department: Evaluation of Process and Effects – 161

Implementation of the Diabetes Practice Guideline in the Army Medical Department: Final Evaluation – 156

Organization, Management and Function of International Space Station (ISS) Multilateral Medical Operations – 180

MEMBRANE STRUCTURES
Study of Nonlinear Oscillations of Elastic Membrane – 265

MEMBRANES
Bucky Paper as a Support Membrane in Retinal Cell Transplantation – 149

MEMS Microshutter for James Webb Space Telescope – 318

MEMORY (COMPUTERS)
Hemingway, A Distributed Shared Memory System – 192

Real-Time High-Dynamic Range Texture Mapping – 199

Using Pin as a Memory Reference Generator for Multiprocessor Simulation – 191

MEMORY
Automated Commonsense Reasoning About Human Memory – 219

Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative – 311

MENTAL PERFORMANCE
PR01 - The Effects of Total Sleep Deprivation and Recovery Sleep on Cognitive Performance and Brain Function – 182

MERCURY (METAL)
Initial Demonstration of Mercury Wavefront Correction System – 287

MESOMETEOROLOGY
An Integrated High Resolution Hydrometeorological Modeling Testbed using LIS and WRF – 145

Calibrated Probabilistic Mesoscale Weather Field Forecasting: The Geostatistical Output Perturbation (GOP) Method – 146

Software User's Manual for the Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS) – 140

MESONS
B Meson Decays to omega K*, omega p, omega omega, omega phi and omega F(sub o) – 273

Measurement of Decay Amplitudes of B to ccbar K asterik with an Angular Analysis, for ccbar=J/Psi, Psi2S and chic 1. The BABAR Collaboration – 267

Measurement of the B+ Yields eta l+ nu and B+ Yields eta l+ nu Branching Fractions Using Upsilon(4S) yields B Bbar Event Tagged bu a Fully Reconstructed B Meson. The BABAR Collaboration – 267

Measurement of the CKM Matrix Element Vcb and Vub at the B-Factories – 259

Measurements of the Decays B0-\gD0bar pp bar, B0-\gD*0pp bar, B0-\gD-pp bar/pi+, and B0-\gD*-pp bar/pi+ – 276

Probing QCD with Rare Charmless B Decays – 263

MESOPHILES
Trichococcus Patagoniensis sp. nov., a Facultative Anaerobe that grows at -5 C, Isolated from Penguin Guano in Chilean Patagonia – 155

MESOSCALE PHENOMENA
An Integrated High Resolution Hydrometeorological Modeling Testbed using LIS and WRF – 145

Calibrated Probabilistic Mesoscale Weather Field Forecasting: The Geostatistical Output Perturbation (GOP) Method – 146

Phase Effects on Mesoscale Object X-ray Attenuation Radiographs – 259

Software User's Manual for the Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS) – 140

MESOSPHERE
Mesospheric Dynamical Changes Induced by the Solar Proton Events in October-November 2003 – 145

MESSAGES
XML-Native Constraint Evaluation – 253

METABOLIC DISEASES
Implementation of the Diabetes Practice Guideline in the Army Medical Department: Final Evaluation – 156

METABOLISM
Dietary Heterocyclic Amines and Polymorphic Variants in the Etiology of Prostate Cancer – 160

DNA Precursor Metabolism and Mitochondrial Genome Stability – 173

Evolution of Catabolic Pathways for Synthetic Compounds Bacterial Pathways for Degradation of 2,4-dinitrotoluene and Nitrobenzene – 164

The Effect of a Home-Based Walking Intervention on Quality of Life, Body Composition, and Estrogen Metabolism in Postmenopausal Breast Cancer Survivors – 169

METAL HALIDES
Methods and Apparatuses for Producing Metallic Compositions via Reduction of Metal Halides – 55

METAL JOINTS
High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems – 57

METAL OXIDE SEMICONDUCTORS
Generating Efficient Layouts from Optimized MOS Circuit Schematics – 82

Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

Methods for Controlling Dopant Concentration and Activation in Semiconductor Structers – 93

METAL OXIDES
Carbon Materials Metal/Metal Oxide Nanoparticle Composite and Battery Anode Composed of the Same – 44

METAL SURFACES
17Beta-Estradiol Modulates the Response of Human Osteoblasts to Titanium Surface Roughness – 58

METALLIC GLASSES
Composition Range and Glass Forming Ability of Ternary Ca-Mg-Cu Bulk Metallic Glasses (Preprint) – 55

Development of Low Density CaMg-Al-Based Bulk Metallic Glasses (Preprint) – 55

METALS
Investigation of Temporal Contrast Effects in Femtosecond Pulse Laser Micromachining of Metals – 291

METASTASIS
Restoration of Epithelial Polarity in Metastatic Tumors – 150

METEORITES
In-situ micro-FTIR Study of Thermal Changes of Organics in Tagish Lake Meteorite: Behavior of Aliphatic Oxygenated Functions and Effects of Minerals – 329

Sm-Nd and Rb-Sr Ages for MIL 05035: Implications for Surface and Mantle Sources – 331

METEORITIC COMPOSITION
A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 328

METEOROLOGICAL PARAMETERS
Analysis of Wintertime Winds in Washington, D.C – 141

METHANE
Action Concentration for Mixtures of VOCs, Methane and Hydrogen – 50

Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

METHODOLOGY
Concentration of Hydrogen Peroxide – 47

Parsimony and Wavelet Methods for Denoising – 283

Response Surface Methodology – 232

MICE
Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity – 178

Effects of Irradiation with Different Dose Rates of X-ray on Mouse Immune System – 177

Mouse Model of Human Breast Cancer Initiated by a Fusion Oncogene – 149

Optical Spectroscopy and Multiphoton Imaging for the Diagnosis and Characterization of Hyperplasias in the Mouse Mammary – 172

Prostate Derived Ets Factor, an Immunogenic Breast Cancer Antigen – 166

Using Genetically Engineered Mice to Probe the Role of Bioactive Lipids in Prostate Carcinogenesis – 157

MICROANALYSIS
Characterization of Lubricants on Ball Bearings by FT-IR Using an Integrating Sphere – 52

MICROCHANNELS
Methods for Forming Small-Volume Electrical Contacts and Material Manipulations with Fluidic Microchannels – 104

MICROELECTROMECHANICAL SYSTEMS
Dynamic IR Scene Projector Based Upon the Digital Micromirror Device – 75

MEMS Actuated Deformable Mirror – 259

MEMS Based Acoustic Array – 281

MEMS Microshutter for James Webb Space Telescope – 318

Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics – 161

Simulation of Biomolecular Nanomechanical Systems – 160

Tem Mems Device Holder and Method of Fabrication – 93

Ultra-Hard Low Friction Coating Based on ALMGB14 for Reduced Wear on MEMS and Other Tribiological Components and System – 59

MICROELECTRONICS
Devices with Small-Scale Channels and the Fabrication Thereof by Etching – 89

MICROFLUIDIC DEVICES
Mobile Monolithic Polymer Elements for Flow Control in Microfluidic Devices – 102

Polymerization Welding and Application to Microfluidics – 60

MICROGRAVITY
Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity – 178

Effects of Microgravity on Human Spatial Orientation in Space Flight – 175

MICROMECHANICS
Micromechanics and Microstructure Evolution: Modeling, Simulation and Experiments. Conference Held in Madrid, Spain, 12-16 Sep 2005 – 297

MICROMETEOROIDS
STS-114 Micrometeoroid/Orbital Debris (MMOD) Post-Flight Assessment – 330

MICROORGANISMS
Epidemic Outbreak Surveillance (EOS) – 168

Silanols, a New Class of Antimicrobial Agent – 153

MICROPHONES
Adaptation to New Microphones Using Tied-Mixture Normalization – 71

MEMS Based Acoustic Array – 281

Microphone-Independent Robust Signal Processing Using Probabilistic Optimum Filtering – 241

The Effect of Microphone Placement on Localization Accuracy with Electronic Pass-Through Earplugs – 284

MICROPROCESSORS
Smart Register Files for High-Performance Microprocessors – 215

MICROSCOPES
Wave Based Inversion and Imaging for the Optical Quadrature Microscope – 290

MICROSCOPY
Confocal Microscopy Studies for Plasma Surface Modified Films and Fibers – 292

Simulation of Organic Magnetic Resonance Force Microscopy Experiments – 50

MICROSTRUCTURE
Effect of Strain-Path Reversal on Microstructure Evolution and Cavitation During Hot Torsion Testing of Ti-6A1-4V (Preprint) – 56

Large Mode-Area Microstructure Optical Fiber – 90

Micromechanics and Microstructure Evolution: Modeling, Simulation and Experiments. Conference Held in Madrid, Spain, 12-16 Sep 2005 – 297

MICROWAVES
Advanced Microwave Ferrite Research (AMFeR): Phase Two – 55

Re-Evaluating Satellite Solar Power Systems for Earth – 130

MIDDLE EAST
U.S. Security Posture in the Middle East: Need for a Change – 336

MIGRATION
Graphene Layer Growth: Collision of Migrating Five-Member Rings – 52

MILITARY OPERATIONS
A Need to Know: The Role of Air Force Reconnaissance in War Planning, 1945-1953 – 17
C-17A Special Operations Low Level II (SOLL II) Supporting the Combatant Commander – 13
Constellation Stretch Goals: Review of Industry Inputs – 250
Implementation of the Asthma Practice Guideline in the Army Medical Department: Evaluation of Process and Effects – 161
Implementation of the Diabetes Practice Guideline in the Army Medical Department: Final Evaluation – 156
Navy Energy/Water Program and Applicable Process Technologies – 133
Round Robin Testing Exercise on Method 8C of the STANAG 4360 – 59
Space Operations – 28
Toward the Use of an Upper Ontology for U.S. Government and U.S. Military Domains: An Evaluation – 336

MILITARY PERSONNEL
Study of Attrition Documentation at the U.S. Navy Recruit Training Command – 310
Weight Measurements and Standards for Soldiers – 165

MILITARY TECHNOLOGY
Defense Display Strategy and Roadmaps – 335
Improving Human Interfaces in Military Simulation Applications – 210
Tanker-Force Structure: Recapitalization of the KC-135 – 15

MILITARY VEHICLES
A Comparison of Mamdani and Sugeno Methods for Modeling Visual Perception Lab Data – 252

MINE DETECTORS
Crawler Control Strategies and Their Influence on Mine Finding Capabilities – 222

MINERALOGY
A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 328
Dynamics of the DAZd Disks – 320

MINERALS
In-situ micro-FTIR Study of Thermal Changes of Organics in Tagish Lake Meteorite: Behavior of Aliphatic Oxygenated Functions and Effects of Minerals – 329
Natural Calcium Isotopic Composition of Urine as a Marker of Bone Mineral Balance – 155

MINES (ORDNANCE)
Directed Energy System for Defeat of Improvised Explosive Devices and Landmines – 288

MINIATURIZATION
FY 2005 Miniature Spherical Retroreflectors Final Report – 258
Miniature and Molecularly Specific Optical Screening Technologies for Breast Cancer – 161

MINING
Chemical Analyses of Water Samples From the Picher Mining Area, Northeast Oklahoma and Southeast Kansas – 38

MIRRORS
MEMS Actuated Deformable Mirror – 260
Reply to Comment by M. Bodeau on 'Charging of Mirror Surfaces in Space' – 32

MISSION PLANNING
Mission Success and Environmental Protection: Orbital Debris Considerations – 317

MISSISSIPPI
Ground-Water Quality Data From the Northern Mississippi Embayment--Arkansas, Missouri, Kentucky, Tennessee, and Mississippi – 123

MITOCHONDRIA
DNA Precursor Metabolism and Mitochondrial Genome Stability – 173

MIXTURES
Elastomer Impact When Switch-Loading Synthetic Fuel Blends and Petroleum Fuels – 63
Fiber Optic Raman Sensor to Monitor Concentration Ratio of Nitrogen and Oxygen in a Cryogenic Mixture – 286

MOBILITY
Ground Mobility M&S Technology Development and Application – 318
Intelligent Mobility Laboratory – 66
Reverse Logistics: Has the Implementation of Reverse Logistics Met the Objectives of Air Mobility Command – 210

MODEL REFERENCE ADAPTIVE CONTROL
Analytical Verification of Undesirable Properties of Direct Model Reference Adaptive Control Algorithms – 250

MODELS
A Model-Driven Architecture Approach for Modeling, Specifying and Deploying Policies in Autonomous and Autonomic Systems – 225
A Set-Covering Approach for Modeling Attacks on Key Predistribution in Wireless Sensor Networks – 214
An Autonomous Glider Network for the Monterey Bay Predictive Skill Experiment / AOSN-II – 10
Analysis and Modeling of Surfzone Turbulence and Bubbles – 106
Biologically Plausible Neural Model for the Recognition of Biological Motion and Actions – 225
Boussinesq Modeling of Alongshore Swash Zone Currents – 102
Calibrated Probabilistic Forecasting Using Ensemble Model Output Statistics and Minimum CRPS Estimation – 241
Computational Limitations of Model Based Recognition – 207
Development of a Navy Job-Specific Vocational Interest Model – 335
Evaluating a Computational Model of Social Causality and Responsibility – 254
Ground Mobility M&S Technology Development and Application – 318
Micromechanics and Microstructure Evolution: Modeling, Simulation and Experiments. Conference Held in Madrid, Spain, 12-16 Sep 2005 – 297
Model Selection in Summary Evaluation – 305
Modeling Stock Order Flows and Learning Market-Making from Data – 204
Mouse Model of Human Breast Cancer Initiated by a Fusion Oncogene – 149
On the Difficulty of Feature-Based Attentional Modulations in Visual Object Recognition: A Modeling Study – 336
Orbiter Gap Filler Bending Model for Reentry – 33
Realistic Modeling of Simple and Complex Cell Tuning in the HMAX Model, and Implications for Invariant Object Recognition in Cortex – 182

MODIS (RADIOMETRY)
Model Calculations of Solar Spectral Irradiance in the 3.7 Micron Band for Earth Remote Sensing Applications – 141

MODULATION
GHz Modulation of GaAs-Based Bipolar Cascade VCSELs (Preprint) – 86
Inverse Compton Scattering on Solar Photons, Heliospheric Modulation, and Neutrino Astrophysics – 322
Modulation in Stator Flux Control of Induction Motor for Reduced Torque Ripple – 77
On the Difficulty of Feature-Based Attentional Modulations in Visual Object Recognition: A Modeling Study – 336
Spread Spectrum Modulation and Signal Masking Using Synchronized Chaotic Systems – 69

MODULATORS
A Quantum Dot Optical Modulator for Integration With Si CMOS – 88

MODULES
Fractionated Spacecraft Architectures Seeding Study – 30
JLAB Ampere-Clast Cryomodule Conceptual Design – 260

MOLECULAR BIOLOGY
Frontiers in Evolutionary Biology. Report of a Workshop – 195

Modeling, Analysis, Simulation, and Synthesis of Biomolecular Networks – 162

Molecular Biology and Prevention of Endometrial Cancer – 170

MOLECULAR INTERACTIONS

Dynamical Study of Guest-Host Orientational Interaction in Liquid Crystalline Materials – 51

MOLECULAR STRUCTURE

Structure and Function Evolution of Thiolate Monolayers on Gold – 48

MOLTEN SALTS

Thermal Storage Commercial Plant Design Study for a 2-Tank Indirect Molten Salt System. Final Report for May 13, 2002 to December 31, 2004 – 128

MOLYBDENUM COMPOUNDS

Molybdenum Disulfide as a Lubricant And Catalyst in Adaptive Nanocomposite Coatings (Preprint) – 53

MOLYBDENUM DISULFIDES

Molybdenum Disulfide as a Lubricant And Catalyst in Adaptive Nanocomposite Coatings (Preprint) – 53

MONKEYS

Selectivity of Local Field Potentials in Macaque Inferior Temporal Cortex – 227

MONTE CARLO METHOD

Bilinear Mixed Effects Models for Dyadic Data – 246

HYDRA: A Java Library for Markov Chain Monte Carlo – 244

Monte Carlo Evaluation of an Iterative Technique for the Design of Observer Field Tests – 187

The Normal Kernel Coupler: An Adaptive Markov Chain Monte Carlo Method for Efficiently Sampling From Multi-Modal Distributions – 232

MONTEREY BAY (CA)

An Autonomous Glider Network for the Monterey Bay Predictive Skill Experiment / AOSN-II – 10

MOON

Not So Rare Earth? New Developments in Understanding the Origin of the Earth and Moon – 125

MORALE

Effective Teamwork: The EVA NBL Experience – 299

MORPHOLOGY

Effect of Inclusion Morphology on the Coefficient of Thermal Expansion in Filled Epoxy Matrix (Preprint) – 47

MOSAICS

In-vivo Imaging of the Photoreceptor Mosaic in Retinal Dystrophies and Correlation with Visual Function – 291

MOTION SIMULATION

Using Motion-Base Simulation to Guide Future Force Systems Design – 113

MOTION

Biologically Plausible Neural Model for the Recognition of Biological Motion and Actions – 225

Scalable Solutions for Interactive Virtual Humans that can Manipulate Objects – 202

MOTIVATION

Motivations to Resolve Communication Dilemmas in Database-Mediated Collaboration – 69

MOUNTAINS

Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository – 51

MULTIMEDIA

A Novel Group Coordination Protocol for Collaborative Multimedia Systems – 193

Comparison of Floor Control Protocols for Collaborative Multimedia Environments – 337

Efficacy of Floor Control Protocols in Distributed Multimedia Collaboration – 337

Softswitch Architecture Remodelling for New Generation IP Multimedia Subsystem Environment – 79

MULTIPATH TRANSMISSION

Multipath Mitigation Performance of Planar GPS Adaptive Antenna Arrays for Precision Landing Ground Stations – 95

MULTIPLE ACCESS

A Near-Optimum Channel Access Protocol Based on Incremental Collision Resolution and Distributed Transmission Queues – 217

Collision Avoidance and Resolution Multiple Access (CARMA) – 213

Extensions of Proportional-Fair Sharing Algorithms for Multi-Access Control of Mobile Communications: Constraints, Finite Queues and Bursty Data Processes – 72

Floor Acquisition Multiple Access with Collision Resolution – 216

Low Complexity Signal Processing and Optimal Joint Detection for Over-Saturated Multiple Access Communications – 68

MULTIPLEXING

Development of multi service provisioning platform in synchronous digital hierarchy systems – 199

Postproduction Re-Illumination of Live Action Using Time-Multiplexed Lighting – 287

MULTIPROCESSING (COMPUTERS)

Efficient Subtorus Processor Allocation in a Multi-Dimensional Torus – 197

Using Pin as a Memory Reference Generator for Multiprocessor Simulation – 191

MULTISENSOR FUSION

Sensor Networking Testbed with IEEE 1451 Compatibility and Network Performance Monitoring – 213

MULTIVARIATE STATISTICAL ANALYSIS

Development of a Data Management Tool for Investigating Multivariate Space and Free Will Experiences in Virtual Reality – 201

Simulated Annealing Type Algorithms for Multivariate Optimization – 248

MUONS

High Field Solenoid Magnets for Muon Cooling – 261

Muon Cooling RF R and D Program – 277

MUSCLES

Prophylactic Effects of Choline Chloride on Muscle Atrophy in Tail-suspended Rats – 177

sEMG Dynamics of Muscle Fatigue Induced by Maximal Voluntary Isometric Contractions – 176

MUSCULAR FUNCTION

Locomotor Dysfunction after Spaceflight: Characterization and Countermeasure Development – 151

MYOCARDIUM

Effects of Tail Suspension on Renin-angiotensin System in Rat Myocardium – 177

NAKHLITES

Ar-39-Ar-40 Ages of Two Nakhlites, MIL03346 and Y000593: A Detailed Analysis – 327

NANOCOMPOSITES

Molybdenum Disulfide as a Lubricant And Catalyst in Adaptive Nanocomposite Coatings (Preprint) – 53

NANOPARTICLES

Biological Applications and Transmission Electron Microscopy Investigation of Mesoporous Silica Nanoparticles – 49

Carbon Materials Metal/Metal Oxide Nanoparticle Composite and Battery Anode Composed of the Same – 44

Enhanced Pinning in YBCO Films with Bazro3 Nanoparticles – 293

NANOSTRUCTURE (CHARACTERISTICS)

Vertically Aligned Nanostructure Scanning Probe Microscope Tips – 41

NANOSTRUCTURE GROWTH

Template-Growth of Highly Ordered Carbon Nanotube Arrays on Silicon POSTPRINT – 53

NANOSTRUCTURES (DEVICES)

Enhanced Pinning in YBCO Films with Bazro3 Nanoparticles – 294

Vertically Aligned Nanostructure Scanning Probe Microscope Tips – 41

NANOTECHNOLOGY
Competing for the Future: Unlocking Small Wonders for Tomorrow's Nanoelectronic Uses – 86
E-MRS Spring Meeting - Nanophotonic Materials Session – 97
Nanoscale Devices for Solid State Refrigeration and Power Generation – 133
Predictive Computations of Properties of Wide-Gap and Nano-Semiconductors – 100

NANOTUBES
Application of Carbon Based Nano-Materials to Aeronautics and Space Lubrication – 114
Nanotube Composites and Methods for Producing – 46

NARROWBAND
Measured Effects of a Narrowband Interference Suppressor on GPS Receivers – 99

NASA PROGRAMS
Digital Learning Network Education Events of NASA's Extreme Environments Mission Operations – 331
Extending NASA Research Results to Benefit Society: Rapid Prototyping for Coastal Applications – 126
Human Factors Considerations for Performance-Based Navigation – 5
Next Generation Air Transportation System: Progress and Challenges Associated with the Transformation of the National Airspace System – 8

NASA SPACE PROGRAMS
Exploration Life Support Technology Development Challenges – 327
NASA CEV On-Orbit GN&C Analysis – 35
NASA CEV Reference Entry GN&C System and Analysis – 21
NASA CEV Reference GN&C Architecture – 21

NATIONAL AIRSPACE SYSTEM
Next Generation Air Transportation System: Progress and Challenges Associated with the Transformation of the National Airspace System – 8

NATURAL GAS
Cost-Effective Reciprocating Engine Emissions Control and Monitoring for E&P Field and Gatherings Engines. Report 14. Technical Report, April 1, 2006-June 30, 2006 – 114

NATURAL LANGUAGE (COMPUTERS)
Information Extraction Supported Question Answering – 309
Named Entity Recognition as a House of Cards: Classifier Stacking – 235
NL Generation for Virtual Humans in a Complex Social Environment – 207
Question Answering Based on Semantic Structures – 301
The Database as Model: A Metatheoretic Approach – 314
The Rate of Progress in Natural Language Processing – 316
Training Tree Transducers – 230

NATURAL LANGUAGE PROCESSING
Experiments in Evaluating Interactive Spoken Language Systems – 316
Stressed and Unstressed Pronouns: Complementary Preferences – 226
Summarization-Inspired Temporal-Relation Extraction: Tense-Pair Templates and Treebank-3 Analysis – 253
The Rate of Progress in Natural Language Processing – 316

NAVIER-STOKES EQUATION
Statistical Analysis of CFD Solutions from the Third AIAA Drag Prediction Workshop – 244

NAVIGATION AIDS
System Considerations of a Wide-Open, Crystal-Video, Two-Channel Direction Finder – 68

NAVIGATION
Navigation Systems – 67

NAVY
A Comparison of the Navy and the Air Force Budgeting and Execution Process for Aviation Fuel (AVFUEL) – 64
Development of a Navy Job-Specific Vocational Interest Model – 335
Navy Energy/Water Program and Applicable Process Technologies – 133
Study of Attrition Documentation at the U.S. Navy Recruit Training Command – 310
The Passive Countermeasures Program at the Naval Research Laboratory – 335

NEAR INFRARED RADIATION
Near-Infrared Fuel Analysis – 63
Three Dimensional Reconstruction Algorithm for Imaging Pathophysiological Signals Within Breast Tissue Using Near Infrared Light – 154

NEGATIVE IONS
Novel Anionic Clay Adsorbents for Boiler-Blow Down Waters Reclaim and Reuse. (Final Report, September 1, 2004-August 31, 2005) – 49

NEODYMIUM ISOTOPES
Rb-Sr and Sm-Nd Isotopic Studies of Martian Depleted Shergottes SaU 094/005 – 327
Sm-Nd Isotopic Systematics of Troctolite 76335 – 330

NEODYMIUM
Sm-Nd and Rb-Sr Ages for MIL 05035: Implications for Surface and Mantle Sources – 331

NEPTUNIUM
Thermodynamics of Neptunium(V) Fluoride and Sulfate at Elevated Temperatures – 51

NERVOUS SYSTEM
Selectivity of Local Field Potentials in Macaque Inferior Temporal Cortex – 227

NETWORK ANALYSIS
A Network Optimization Approach for Improving Organizational Design – 248
Analysis of Flicker Levels in the Slovenian Transmission Network – 81
Graph-based Representations and Coupled Verification of VLSI Schematics and Layouts – 95
Modeling, Analysis, Simulation, and Synthesis of Biomolecular Networks – 162
Query-Driven Network Flow Data Analysis and Visualization. Final Report – 187
Response Surface Methodology – 232
Self-calibration on a Three-sampler Network Analyzer with Nonstandard Connectors – 212
Sensor Networking Testbed with IEEE 1451 Compatibility and Network Performance Monitoring – 213

NETWORK CONTROL
Collision Avoidance and Resolution Multiple Access (CARMA) – 213

NETWORKS
Modeling, Analysis, Simulation, and Synthesis of Biomolecular Networks – 162

NEURAL NETS
A Detailed Look at Scale and Translation Invariance in a Hierarchical Neural Model of Visual Object Recognition – 224
A Hierarchical Algorithm for Neural Training and Control. Revision – 236
Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative – 311
Continuous Speech Recognition Using Segmental Neural Nets – 74
Feedback Linearized Aircraft Control Using Dynamic Cell Structure – 25
Fitting APD Restitution with Artificial Neural Network – 174
Improving State-of-the-Art Continuous Speech Recognition System Using the N-Best Paradigm with Neural Networks – 74
Neural Mechanisms of Object Recognition – 190
Variable Background Born Inversion by Wavefield Backpropagation – 188

NEUROPHYSIOLOGY
Communications System Based on Real-Time Neurophysiological Characterization – 70

NEUTRINOS

First Results from IceCube – 323

Inverse Compton Scattering on Solar Photons, Heliospheric Modulation, and Neutrino Astrophysics – 322

Proposal for an Experimental Program in Neutrino Physics and Proton Decay in the Homestake Laboratory – 274

NEUTRON SOURCES

History of the ZGS 500 MeV Booster – 265

SNS Cryogenic Systems Commissioning – 295

NEUTRON STARS

The ROSSI X-Ray Timing Explorer: Capabilities, Achievements and Aims – 325

NEUTRONS

How Accurately Can We Calculate Neutrons Slowing Down in Water – 271

Neutron Resonance Parameters of 238U and the Calculated Cross Sections from the Reich-Moore Analysis of Experimental Data in the Neutron Enrgy Range from O keV to 20 keV – 293

NEW YORK CITY (NY)

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Amendments to the Fire Protection and Life Safety Provisions of the New York City Building Code by Local Laws Adopted While World Trade Center 1, 2, and 7 Were in Use. NIST NCSTAR 1-1G – 121

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of the 1968 and Current (2003) New York City Building Code Provisions. NIST NCSTAR 1-1F – 118

NICKEL ALLOYS

Methods to Calculate Corrosion Rates for Alloy 22 from Polarization Resistance Experiments – 50

NIGHT VISION

A Unified Taxonomic Approach to the Laboratory Assessment of Visionic Devices – 184

NIOBIUM

Investigation of Hot-Spots as a Function of Material Removal in a Large-Grain Niobium Cavity – 259

Performances of High Purity Niobium Cavities with Different Grain Sizes – 258

NITRIDES

Gallium Nitride Crystals and Wafers and Method of Making – 265

NITROBENZENES

Evolution of Catabolic Pathways for Synthetic Compounds Bacterial Pathways for Degradation of 2,4-dinitrotoluene and Nitrobenzene – 164

NITROGEN DIOXIDE

Comparison of Satellite Observations of Nitrogen Dioxide to Surface Monitor Nitrogen Dioxide Concentration – 135

Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

Zeeman Tuning Rates in the v3 Band of NO2 – 110

NITROGEN POLYMERS

Macroscopic Fiber Comprising Single-Wall Carbon Nanotubes and Acrylonitrile-Based Polymer and Process for Making the Same – 46

NITROGEN

Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

NODES (STANDING WAVES)

Broadcast with Heterogeneous Node Capability – 88

NOISE GENERATORS

A Wide-Band Video Noise Source, 50 KC to 10 MC – 108

Aerodynamic Performance Measurements for a Forward Swept Low Noise Fan – 2

NOISE MEASUREMENT

International Electrotechnical Commission Standard IEC 61400-11 and Other Procedures. Acoustic Noise Measurement Techniques – 283

NOISE REDUCTION

Research on ECG Denoising during Spaceflight – 177

NOISE (SOUND)

International Electrotechnical Commission Standard IEC 61400-11 and Other Procedures. Acoustic Noise Measurement Techniques – 283

NONDESTRUCTIVE TESTS

Laser Shearography Inspection of TPS (Thermal Protection System) Cork on RSRM (Reusable Solid Rocket Motors) – 116

NONLINEAR OPTICS

Extreme Nonlinear Optics With Liquid Crystals – 287

NONLINEAR SYSTEMS

A Hierarchical Algorithm for Neural Training and Control. Revision – 236

Nonlinear Dynamical Systems – 196

NONLINEARITY

Development of a Non-Linear Element Code for the Improvement of Piezoelectric Actuator Design and Reliability – 88

Model Reduction of Systems with Localized Nonlinearities – 198

Nonlinear Dynamic Maximum Power Theorem, with Numerical Method – 233

Study of Nonlinear Oscillations of Elastic Membrane – 265

Toward a Theory of Nonlinear Stochastic Realization – 230

NORMALIZED DIFFERENCE VEGETATION INDEX

Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 125

NORTH ATLANTIC TREATY ORGANIZATION (NATO)

Test Report on the November 2005 NATO RTG-40 Active Imager Land Field Trials – 108

NOTCHES

Origin and Evolution of Deep Plasmaspheric Notches – 327

NOZZLE DESIGN

Arcjet Semi-Elliptic Nozzle Simulations and Validation in Support of TPS Testing – 101

NOZZLE FLOW

NASA/MSFC's Calculation for Test Case 1a of ATAC-FSDC Workshop on After-body and Nozzle Flows – 102

NUCLEAR ENERGY

Radio-Frequency Driven Dielectric Heaters for Non-Nuclear Testing in Nuclear Core Development – 285

NUCLEAR INTERACTIONS

Nuclear Receptor Interactions in Breast Cancer: The Role of Kinase Signaling Pathways – 173

NUCLEAR MAGNETIC RESONANCE

A Training Program in Breast Cancer Research Using NMR Techniques – 149

NUCLEAR POWER PLANTS

High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems – 57

NUCLEAR POWER REACTORS

Post Irradiation Evaluation of Thermal Control Coatings and Solid Lubricants to Support Fission Surface Power Systems – 115

NUCLEAR REACTIONS

Nuclear Reaction and Structure Databases of the National Nuclear Data Center – 323

Technology Development Program for an Advanced Potassium Rankine Power Conversion System Compatible with Several Space Reactor Designs – 27

NUCLEAR REACTORS

Status of Physics and Safety Analyses for the Liquid Salt Cooled Very High Temperature Reactor (LS-VHTR) – 286

NUCLEAR WEAPONS

FY 2005 Quantum Cascade Laser Alignment System. Final Report – 290

Report of the Defense Science Board Task Force on Nuclear Capabilities Report Summary – 286

NUCLEONS

Nucleon resonance studies in phenomenological analysis of the CLAS data on double charged pion photo and electroproduction – 268

NUMBER THEORY

Sensitivity in Risk Analyses with Uncertain Numbers – 191

NUMERICAL ANALYSIS

A High-Level Formalization of Floating-Point Number in PVS – 204

Ion Motion in the Adiabatic Focuser – 296

Nonlinear Dynamic Maximum Power Theorem, with Numerical Method – 233

Numerical Methods for Analysis of Charged Vacancy Diffusion in Dielectric Solids – 95

On Interpolation and Integration in Finite-Dimensional Spaces of Bounded Functions – 233

Structural Uncertainties in Numerical Induction Models – 240

The Schur Algorithm and Its Applications – 232

Toward a Theory of Nonlinear Stochastic Realization – 230

NUMERICAL CONTROL

Building Explainable Artificial Intelligence Systems – 224

Hierarchical Role-based Viewing for Multi-level Information Security in Collaborative CAD – 307

How to Prevent Type-Flaw Guessing Attacks on Password Protocols – 215

Scalable Authorization in Role-Based Access Control Using Negative Permissions and Remote Authorization – 217

NUMERICAL INTEGRATION

Comparison of Fixed and Variable Time Step Trajectory Integration Methods for Cislunar Trajectories – 231

NUMERICAL WEATHER FORECASTING

An Integrated High Resolution Hydrometeorological Modeling Testbed using LIS and WRF – 145

NUTRITION

Dietary Determinants of Prostate Cancer – 170

OBESITY

Central Leptin Gene Therapy to Reduce Breast Cancer Risk Factors – 167

OBJECT-ORIENTED PROGRAMMING

Standardization of Object Oriented Extensions to Vector Signal and Image Processing Library (VSIPL) – 209

Stimulus Simplification and Object Representation: A Modeling Study – 193

The Case for an Open Data Model – 201

OCEAN MODELS

Sensor to User - NASA/EOS Data for Coastal Zone Management Applications Developed from Integrated Analyses: Verification, Validation and Benchmark Report – 126

OCEANOGRAPHY

Sensor to User - NASA/EOS Data for Coastal Zone Management Applications Developed from Integrated Analyses: Verification, Validation and Benchmark Report – 126

Software User's Manual for the Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS) – 140

OCEANS

An Autonomous Glider Network for the Monterey Bay Predictive Skill Experiment / AOSN-II – 10

ODORS

Method and System for Treating Contaminants and Ordors in Airborne Emissions – 138

Speed-Accuracy Tradeoff in Olfaction – 156

OIL RECOVERY

Time-Lapse Seismic Modeling and Inversion Modeling and Inversion of CO2 Saturation for Sequestration and Enhanced Oil Recovery – 136

OKLAHOMA

Chemical Analyses of Water Samples From the Picher Mining Area, Northeast Oklahoma and Southeast Kansas – 38

OLFACTORY PERCEPTION

Speed-Accuracy Tradeoff in Olfaction – 156

OLIGOMERS

The Oligodendrocyte Progenitor Response to Demyelination – 152

OMNIDIRECTIONAL ANTENNAS

Medium Access Control in Ad Hoc Networks With Omni-Directional and Directional Antennas – 67

ONCOGENES

Mouse Model of Human Breast Cancer Initiated by a Fusion Oncogene – 149

ON-LINE SYSTEMS

On-Line Fault Detection and Isolation Using Analytical Redundancy – 80

OPEN SOURCE LICENSING (COMPUTERS)

A Business Case Study of Open Source Software – 207

OPTICAL COMMUNICATION

Analysis of PMD Compensators With Fixed DGD Using Importance Sampling – 98

Optical Regenerative Amplifier for Binary Phase Shift-Keying Signals – 289

OPTICAL COUNTERMEASURES

Using Observer Ratings to Assess Situational Awareness in Tactical Air Environments – 6

OPTICAL DATA PROCESSING

Optical Flow Computation via Multiscale Regularization – 98

OPTICAL EQUIPMENT

Apparatus for Using Optical Tweezers to Manipulate Materials – 288

Project Clinker, Hydraulic Carriage for Airship Installation of Optical Equipment – 16

SABER Optical Design – 264

OPTICAL FIBERS

Analysis of PMD Compensators With Fixed DGD Using Importance Sampling – 98

Large Mode-Area Microstructure Optical Fiber – 90

OPTICAL MATERIALS

Apparatus for Using Optical Tweezers to Manipulate Materials – 288

E-MRS Spring Meeting - Nanophotonic Materials Session – 97

OPTICAL MEASUREMENT

Design Considerations for the Second-Generation NPOI Fringe Tracker and Science Beam Combiner – 292

Laser-Based Spectroscopic Detection Techniques – 288

OPTICAL MEASURING INSTRUMENTS

Direct Imaging of Stellar Surfaces: Results from the Stellar Imager (SI) Vision Mission Study – 325

E-MRS Spring Meeting - Nanophotonic Materials Session – 97

Live Modeling of a Dyna Vision SPR-02 Sensor for Rangefinding Application – 110

OPTICAL MICROSCOPES

Wave Based Inversion and Imaging for the Optical Quadrature Microscope – 290

OPTICAL POLARIZATION

Target/Background Polarization Profiles Using a COTS Digital Camera – 108

OPTICAL PROPERTIES

A Unified Taxonomic Approach to the Laboratory Assessment of Visionic Devices – 184

Optical Flow Computation via Multiscale Regularization – 98

Parabolic Trough VSHOT Optical Characterization in 2005-2006 – 129

The Effect of Hot Isostastic Pressing on the Optical Properties Of Spinel – 62

OPTICAL RADAR

Turbulence and Mountain Wave Conditions Observed with an Airborne 2-Micron Lidar – 19

OPTICAL SCANNERS

Parabolic Trough VSHOT Optical Characterization in 2005-2006 – 129

OPTICAL SWITCHING

All-Optical Controllable Photonic Switch – 290

Tunable Temporal Dispersion and Compensated Angular Dispersion in Optical Switching Systems – 88

OPTIMAL CONTROL

State Feedback l(sub 1)-Optimal Controllers can be Dynamic – 215

OPTIMIZATION

A Network Optimization Approach for Improving Organizational Design – 248

An Operator-Theoretic Approach to the Mixed-Sensitivity Minimization Problem – 236

An Optimal Parallel Implementation of a Quadratic Transportation Algorithm – 206

An Optimization of Pulsed ElectroMagnetic Fields Study – 156

Characteristic Shape Sequences for Measures on Images – 252

Enhancement of Stochastic Resonance Using Optimization Theory – 249

Fast Approximation Schemes for Multi-Criteria Flow, Knapsack, and Scheduling Problems – 230

Importance of Cooling System Optimization with Regard to Lifetime and Reliability of Power Transformers – 76

Mesh Partitioning with Ant Colonies – 76

Metropolis-type Annealing Algorithms for Global Optimization in IRd – 231

On the Distributions of Optimized Multiscale Representations – 107

Principles of Fit to Optimize Helmet Sizing – 185

Simulated Annealing Type Algorithms for Multivariate Optimization – 248

Simulation and Optimisation of a 100MA DC Photo-Injector – 258

Statistical Learning: Stability is Sufficient for Generalization and Necessary and Sufficient for Consistency of Empirical Risk Minimization – 256

OPTOELECTRONIC DEVICES

Integrated Cooling for Optoelectronic Devices – 287

ORBITAL RENDEZVOUS

Simulation Study on Performance of Control by Man and Machine in the Stage of Final Approaching for Rendezvous and Docking – 175

ORGANIC COMPOUNDS

Action Concentration for Mixtures of VOCs, Methane and Hydrogen – 50

ORGANIC MATERIALS

A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 328

In-situ micro-FTIR Study of Thermal Changes of Organics in Tagish Lake Meteorite: Behavior of Aliphatic Oxygenated Functions and Effects of Minerals – 328

Simulation of Organic Magnetic Resonance Force Microscopy Experiments – 50

ORGANIZATIONS

A Network Optimization Approach for Improving Organizational Design – 248

A Personalized Calendar Assistant – 311

On the Design of Information-Processing and Decisionmaking Organizations – 251

Organization, Management and Function of International Space Station (ISS) Multilateral Medical Operations – 180

ORIENTATION

Dynamical Study of Guest-Host Orientational Interaction in Liquid Crystalline Materials – 51

OSCILLATING FLOW

Nonhydrostatic Numerical Investigations of Oscillating Flow over Sills: Generation of Internal Tides and Solitary Waves – 234

OSCILLATIONS

Responding to Mechanical Antigravity – 37

Study of Nonlinear Oscillations of Elastic Membrane – 265

OSTEOBLASTS

17Beta-Estradiol Modulates the Response of Human Osteoblasts to Titanium Surface Roughness – 58

OUTPUT

Output Stabilizability of Discrete Event Dynamic Systems – 194

OXIDATION-REDUCTION REACTIONS

Electron Transfer Reactivity Patterns at Chemically Modified Electrodes: Fundamentals and Application to the Optimization of Redox Recycling Amplification Systems – 49

OXYGEN ISOTOPES

Genesis Silicon Carbide Concentrator Target 60003 Preliminary Ellipsometry Mapping Results – 329

OXYGEN TENSION

Effect of O2 Partial Pressure on YBa2Cu3O7-delta Thin Film Growth by Pulsed Laser Deposition – 54

OXYGENATION

In-situ micro-FTIR Study of Thermal Changes of Organics in Tagish Lake Meteorite: Behavior of Aliphatic Oxygenated Functions and Effects of Minerals – 329

Monitoring Cancer Oxygenation Changes Induced by Ultrasound – 150

OXYGEN

Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint) – 62

Pressure Effects on Oxygen Concentration Flammability Thresholds of Materials for Aerospace Applications – 35

OZONE

Comparison of Satellite Observations of Nitrogen Dioxide to Surface Monitor Nitrogen Dioxide Concentration – 135

Decontamination of Genesis Array Materials by UV Ozone Cleaning – 329

PACKET SWITCHING

A Near-Optimum Channel Access Protocol Based on Incremental Collision Resolution and Distributed Transmission Queues – 217

Floor Acquisition Multiple Access with Collision Resolution – 216

PAINT REMOVAL

Effect of the FlashJet Paint Removal System on Rotor Blade Skin Materials – 39

PAINTS

Round Robin Testing Exercise on Method 8C of the STANAG 4360 – 59

PALLADIUM ALLOYS

Comparative Corrosion Behavior of Two Palladium-Containing Titanium Alloys – 50

PALLADIUM

Comparative Corrosion Behavior of Two Palladium-Containing Titanium Alloys – 50

PANELS

Developing an Inflatable Solar Array – 31

PARABOLAS

Inversion of Generalized Parabolic Projections – 236

PARABOLIC REFLECTORS

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 1: Preferred Plant Size. Report for January 20, 2005 to December 31, 2005 – 129

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 2: Comparison of Wet and Dry Rankine Cycle Heat Rejection. Report for January 20, 2005 to December 31, 2005 – 128

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 3: Multiple Plants at a Common Location. Report for January 20, 2005 to December 31, 2005 – 128

Parabolic Trough VSHOT Optical Characterization in 2005-2006 – 129

Trough Receiver Heat Loss Testing – 129

PARALLEL COMPUTERS

An Optimal Parallel Implementation of a Quadratic Transportation Algorithm – 206

Parallel Computer Implementation of Fast Low-Rank QR Approximation of the Biot-Savart Law – 188

Parallel Smoothing Algorithms for Casual and Acausal Systems – 232

PARALLEL PROCESSING (COMPUTERS)

HARP: A Fast Spectral Partitioner – 231

Using Heterogeneous High Performance Computing Cluster for Supporting Fine-Grained Parallel Applications – 199

PARALLEL PROGRAMMING

Evaluating Co-Array Fortran and Unified Parallel C – 206

The DINO Parallel Programming Language – 206

PARSING ALGORITHMS

Speed and Accuracy in Shallow and Deep Stochastic Parsing – 241

PARTIAL PRESSURE

Effect of O2 Partial Pressure on YBa2Cu3O7-delta Thin Film Growth by Pulsed Laser Deposition – 54

PARTICLE ACCELERATORS

Amplitude Linearizers for PEP-II 1.2 MW Klystrons and LLRF Systems – 294

Bunch Length Measurements at the JLab FEL Using Coherent Transition and Synchrotron Radiation – 294

Comparison of 2 mrad and 14/20 mrad Crossing Angle Extraction Lines – 296

Design and Testing of Gproto bunch-by-bunch Signal Processor – 294

Ion Effects in the Electron Damping Ring of the International Linear Collider – 295

Ion Motion in the Adiabatic Focuser – 296

Jefferson Lab's Distributed Data Acquisition – 296

Neutron Resonance Parameters of 238U and the Calculated Cross Sections from the Reich-Moore Analysis of Experimental Data in the Neutron Enrgy Range from O keV to 20 keV – 293

Proceedings of the Oak Ridge Electron Linear Accelerator (ORELA) Workshop – 323

SNS Cryogenic Systems Commissioning – 295

Wakefields in the LCLS Undulator Transitions – 295

PARTICLE DECAY

B Meson Decays to omega K*, omega p, omega omega, omega phi and omega F(sub o) – 273

Measurement of B Decays to PhiK-Gamma – 278

Measurement of Decay Amplitudes of B to ccbar K asterik with an Angular Analysis, for ccbar=J/Psi, Psi2S and chic 1. The BABAR Collaboration – 267

Measurements of the Decays B0-\gD0bar pp bar, B0-\gD*0pp bar, B0-\gD-pp bar/pi+, and B0-\gD*-pp bar/pi+ – 276

New Developments in Measurements of CP Violation – 275

Proposal for an Experimental Program in Neutrino Physics and Proton Decay in the Homestake Laboratory – 274

Recent tau Physics Studies at BABAR – 263

PARTICLE IMAGE VELOCIMETRY

Personal Identity Verification Demonstration Summary – 195

PARTICLE MOTION

Particle Tracking and Simulation on the .NET Framework – 273

PARTICLE PRODUCTION

First Results from IceCube – 323

PARTICLE TRACKS

Particle Tracking and Simulation on the .NET Framework – 273

PARTITIONS (MATHEMATICS)

HARP: A Fast Spectral Partitioner – 231

Mesh Partitioning with Ant Colonies – 76

PARTONS

Parton Bubble Model for Two Particle Angular Correlations at RHIC/LHC – 261

Parton Orbital Angular Momentum – 262

PASSIVITY

Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

PATENT APPLICATIONS

Apparatus for Using Optical Tweezers to Manipulate Materials – 288

Architecture for Rendering Graphics on Output Devices Over Diverse Connections – 305

Bias-Adjusted Giant Magnetoresistive (GMR) Devices for Magnetic Random Access Memory (MRAM) Applications – 70

Communications System Based on Real-Time Neurophysiological Characterization – 70

Devices with Small-Scale Channels and the Fabrication Thereof by Etching – 89

Enhanced Pinning in YBCO Films with Bazro3 Nanoparticles – 293

Fast Access, Low Memory, Pair Catalog – 1

High Sensitivity Array-Based Detection System – 94

Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

Integrated Inverter for Driving Multiple Electric Machines – 89

Ionic Solvents Used in Ionic Polymer Transducers, Sensors and Actuators – 41

Laser-Based Spectroscopic Detection Techniques – 288

Lu(sup 1)xI(sup 3):Ce(sup x): A Scintillator for Gamma Ray Spectroscopy and Time-Of Flight Pet – 266

Method and Device for Creating a Micro Plasma Jet – 23

Method and System for Determining the Position of a Short Circuit in a Branched Wiring System – 91

Method and System for Identifying Damage to a Wire – 92

Method of Defining Features on Materials with a Femtosecond Laser – 288

Methods and Systems for Detecting and Locating Damage in a Wire – 92

Methods and Systems for Testing Wire Insulation – 92

Methods for Controlling Dopant Concentration and Activation in Semiconductor Structers – 93

Methods for Forming Small-Volume Electrical Contacts and Material Manipulations with Fluidic Microchannels – 104

Mixed Mode Fuel Injector and Injection System – 114

Motion-Based Visualization, Part Two – 196

Nanotube Composites and Methods for Producing – 46

Novel Hydrogels and Uses Thereof – 43

Optical Regenerative Amplifier for Binary Phase Shift-Keying Signals – 289

Polymeric Bioresorbable Composites Containing an Amorphous Calcium Phosphate Polymer Ceramic for Bone Repair and Replacement – 45

Polymerization Welding and Application to Microfluidics – 60

Reactive Materials and Thermal Spray Methods of Making Same – 56

Recuperator Assembly and Procedures – 23

Semiconductor Conductive Layers – 89

Simplified Hybrid Secondary Uncluttered Machine and Method – 88

Structures Including Network and Topology for Identifying, Locating and Quantifying Physical Phenomena – 39

Tem Mems Device Holder and Method of Fabrication – 93

Tunable Temporal Dispersion and Compensated Angular Dispersion in Optical Switching Systems – 88

Ultra-Hard Low Friction Coating Based on ALMGB14 for Reduced Wear on MEMS and Other Tribiological Components and System – 59

Vertically Aligned Nanostructure Scanning Probe Microscope Tips – 41

Very Fast Doped LaBr(sup 3) Scintillators and Time-Of-Flight Pet – 266

PATHOGENESIS

Fully Virulent Bacillus Anthracis Does Not Require the Immunodominant Protein BclA for Pathogenesis – 164

Randomized Trial of Neuroprotective Effects of Erythropoietin in Patients Receiving Adjuvant Chemotherapy for Breast Cancer: Position Emission Tomography and NE – 171

The Role of CRELD1 Isoform 9b in the Pathogenesis of Breast Cancer – 150

PATHOGENS

Epidemic Outbreak Surveillance (EOS) – 168

Simulation of Biomolecular Nanomechanical Systems – 160

PATIENTS

Randomized Trial of Neuroprotective Effects of Erythropoietin in Patients Receiving Adjuvant Chemotherapy for Breast Cancer: Position Emission Tomography and NE – 171

PATROLS

Border Security: Barriers Along the U.S. International Border – 117

PATTERN RECOGNITION

A Biological Model of Object Recognition with Feature Learning – 222

A Detailed Look at Scale and Translation Invariance in a Hierarchical Neural Model of Visual Object Recognition – 224

Computational Limitations of Model Based Recognition – 207

Face Recognition with Support Vector Machines: Global versus Component-Based Approach – 205

Information Extraction Supported Question Answering – 309

Neural Mechanisms of Object Recognition – 190

On the Difficulty of Feature-Based Attentional Modulations in Visual Object Recognition: A Modeling Study – 336

People Recognition in Image Sequences by Supervised Learning – 286

Realistic Modeling of Simple and Complex Cell Tuning in the HMAX Model, and Implications for Invariant Object Recognition in Cortex – 182

PATTERN REGISTRATION

Registration without Correspondences – 228

PAVEMENTS

Performance Comparison of Hot Rubber Crack Sealants to Emulsified Asphalt Crack Sealants – 42

Seismic Measurement of Concrete Strength Properties – 27

PAYLOADS

Autonomous Aerobraking Using Thermal Response Surface Analysis – 34

PELLETS

Toxicological Evaluation of Depleted Uranium in Rats: Six-Month Evaluation Point – 168

PENUMBRAS

Five Millennium Canon of Solar Eclipses: -1999 to +3000 (2000 BCE to 3000 CE) – 320

PEPTIDES

Glycopetide-Based Immunotherapy for Prophylaxis and Treatment of Mammary Adenocarcinomas – 149

Novel Hydrogels and Uses Thereof – 43

PERFORMANCE PREDICTION

Characterization and Modeling of Bonded Piezoelectric Sensor Performance and Durability in Simulated Aircraft Environments (Preprint) – 17

Preliminary Derivation of Test Item Clusters for Predicting Injuries, Poor Physical Performance, and Overall Attrition in Basic Combat Training – 253

PERFORMANCE TESTS

Comparative Studies of Proton Accelertors for High Power Applications – 275

Evaluation of a New Liquid Fire-Extinguishing Agent for Combustible Metal Fires – 42

Evaluation of TCP Congestion Control Algorithms on the Windows Vista Platform – 263

Long-Run Performance of Bayesian Model Averaging – 233

Performance Analysis of Poll-Based Retransmission Schemes – 336

Performance, Thermal, and Vibration Qualification Testing of Zetec Acoustic Transducers, Model Z0002659-2, Sondicator Probes – 282

PERMANENT MAGNETS

Fractional-Slot Surface Mounted PM Motors with Concentrated Windings for HEV Traction Drives – 85

Interior Permanent Magnet Reluctance Machine with Brushless Field Excitation – 85

PERSONNEL MANAGEMENT

Effective Teamwork: The EVA NBL Experience – 299

PERSONNEL

Effective Teamwork: The EVA NBL Experience – 299

Personal Identity Verification Demonstration Summary – 195

PERSPIRATION

Transient Sweat Rate Calculation from Humidity Measurements Under Clothing – 298

PERTURBATION THEORY

Calibrated Probabilistic Mesoscale Weather Field Forecasting: The Geostatistical Output Perturbation (GOP) Method – 146

Conditions for Scale-Based Decompositions in Singularly Perturbed Systems – 240

PERTURBATION

Analysis, Estimation, and Control for Perturbed and Singular Systems and for Systems Subject to Discrete Events – 250

Asymptotic Orders of Reachability in Perturbed Linear Systems – 189

PETRI NETS

Coloured Petri Net Modelling of a Generic Avionics Mission Computer – 200

PHARMACOLOGY

Pharmacokinetic Modeling of JP-8 Jet Fuel Components: II. A Conceptual Framework – 63

PHASE DIAGRAMS

Isothermal (Delta)/(Alpha-Prime) Transformation and TTT Diagram in a Plutonium Gallium Alloy – 38

PHASE TRANSFORMATIONS

In-Situ Observation of Phase Transformations During Welding of 1045 Steel Using Spatially Resolved and Time Resolved X-Ray Diffraction – 57

Phase Transformation of ‘Chem-prep’ PZT 95/5-2Nb HF 1035 Ceramic Under Quasi-static Loading Conditions – 60

PHASED ARRAYS

Ultra Small Aperture Terminal (USAT) Phased Array Technology Demonstrator – 100

PHENOMENOLOGY

Jefferson Lab Phenomenology: Selected Highlights – 277

Nucleon resonance studies in phenomenological analysis of the CLAS data on double charged pion photo and electroproduction – 268

PHOSPHORUS

Effect of Chimaerins, Novel Receptors for Phorbol Esters, on Breast Cancer Cell Proliferation and Cell Cycle Progression – 165

PHOSPHORYLATION

Optical Spectroscopy and Multiphoton Imaging for the Diagnosis and Characterization of Hyperplasias in the Mouse Mammary – 172

PHOTOCHEMICAL REACTIONS

Comparison of Satellite Observations of Nitrogen Dioxide to Surface Monitor Nitrogen Dioxide Concentration – 135

PHOTOGRAMMETRY

Method for Correcting Control Surface Angle Measurements in Single Viewpoint Photogrammetry – 12

PHOTOIONIZATION

X-Ray Spectral Study of the Photoionized Stellar Wind in Vela X-1 – 324

PHOTOMETERS

High Sensitivity Array-Based Detection System – 94

Quantum Interference Effect and Electric Field Domain Formation in Quantum Well Infrared Photodetectors – 109

PHOTONICS

Competing for the Future: A Historical Review of NIST ATP Investments in Photonics and Optical Technologies – 87

Self-Assembled Colloidal Crystals for Photonic Applications and Its Outlook – 293

Trends and Opportunities in Photonics Technologies: Solid-State Lighting and Healthcare – 87

PHOTONS

Inverse Compton Scattering on Solar Photons, Heliospheric Modulation, and Neutrino Astrophysics – 323

PHOTORECEPTORS

In-vivo Imaging of the Photoreceptor Mosaic in Retinal Dystrophies and Correlation with Visual Function – 291

PHOTOVOLTAIC CONVERSION

Accelerating PV Cost Effectiveness Through Systems Design, Engineering, and Quality Assurance. Phase 1 Annual Technical Report, November 4, 2004-November 3, 2005 – 130

Device Performance – 83

Electro-Optical Characterization – 128

Surface Analysis – 128

PHYSICAL EXERCISE

Effect of Palm Cooling with Negative Pressure on Heat Balance During Exercise in a Hot, Dry Environment – 157

Exercise and Bone Density: Meta-Analysis – 151

Round Robin Testing Exercise on Method 8C of the STANAG 4360 – 59

PHYSICAL FACTORS

Structures Including Network and Topology for Identifying, Locating and Quantifying Physical Phenomena – 39

PHYSICAL FITNESS

Preliminary Derivation of Test Item Clusters for Predicting Injuries, Poor Physical Performance, and Overall Attrition in Basic Combat Training – 253

PHYSIOCHEMISTRY

Pulse Detonation Physiochemical and Exhaust Relaxation Processes – 24

PIEZOELECTRICITY

Characterization and Modeling of Bonded Piezoelectric Sensor Performance and Durability in Simulated Aircraft Environments (Preprint) – 17

Development of a Non-Linear Element Code for the Improvement of Piezoelectric Actuator Design and Reliability – 88

PILOT ERROR

Operational Interventions to Maintenance Error – 6

PILOT PERFORMANCE

Comanche Helmet-Mounted Display Heading-Tape Simulation – 20

Comanche Helmet-Mounted Display Symbology Simulation – 20

PILOT TRAINING

R&D Advances in USAF Pilot Training – 10

PILOTLESS AIRCRAFT

A Summary of Unmanned Aircraft Accident/Incident Data: Human Factors Implications – 10

Collision Avoidance for Unmanned Aircraft: Proving the Safety Case – 6

Design of Autonomous Navigation Controllers for Unmanned Aerial Vehicles Using Multi-Objective Genetic Programming – 18

Guidance and Control of an Autonomous Soaring UAV – 25

High Altitude Long Endurance Air Vehicle Analysis of Alternatives and Technology Requirements Development – 14

PINNING

Enhanced Pinning in YBCO Films with Bazro3 Nanoparticles – 294

PINS

CCD and PIN-CMOS Developments for Large Optical Telescope – 332

Failure Analysis of a CH-47 Horizontal Hinge Pin Assembly, P/N 114RS226 – 14

PIONS

Nucleon resonance studies in phenomenological analysis of the CLAS data on double charged pion photo and electroproduction – 268

PISTON ENGINES

Cost-Effective Reciprocating Engine Emissions Control and Monitoring for E&P Field and Gatherings Engines. Report 14. Technical Report, April 1, 2006-June 30, 2006 – 114

PITCH (INCLINATION)

Angle Measurement System (AMS) for Establishing Model Pitch and Roll Zero, and Performing Single Axis Angle Comparisons – 25

PIVOTS

Joint Synthetic Battlespace Desert Pivot Experiment (JDPE) – 211

PLANE WAVES

Simultaneous Inversion of Velocity and Density Profiles – 237

PLANETARY COMPOSITION

Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

PLANETARY EVOLUTION

Not So Rare Earth? New Developments in Understanding the Origin of the Earth and Moon – 125

Origin and Evolution of Deep Plasmaspheric Notches – 326

The Origin of Dark Inclusions in Allende: New Evidence from Lithium Isotopes – 330

PLANETARY WAVES

Modeling the Observed Solar Cycle Variations of the Quasi-biennial Oscillation (QBO): Amplification by Wave Forcing – 144

PLANNING

A Need to Know: The Role of Air Force Reconnaissance in War Planning, 1945-1953 – 17

Next Generation Air Transportation System Integrated Plan – 7

Strategic Plan: 2000-2005 – 309

PLANT DESIGN

Thermal Storage Commercial Plant Design Study for a 2-Tank Indirect Molten Salt System. Final Report for May 13, 2002 to December 31, 2004 – 128

PLASMA DIAGNOSTICS

High Magnetic Field Generation for Laser-Plasma Experiments – 270

Solid-Density Plasma Characterization with X-Ray Scattering on the 200-J Janus Laser – 271

Time-Resolved Soft X-Ray Imaging (SXRI) Diagnostic for Use at the NIF and OMEGA Lasers – 270

PLASMA RADIATION

Radiation and Plasma Environments for Lunar Missions – 333

PLASMA WAVES

Alfven Waves in the Solar Wind, Magnetosheath, and Outer Magnetosphere – 333

PLASMAS (PHYSICS)

Confocal Microscopy Studies for Plasma Surface Modified Films and Fibers – 292

Method and Device for Creating a Micro Plasma Jet – 23

Solid-Density Plasma Characterization with X-Ray Scattering on the 200-J Janus Laser – 271

PLASMASPHERE

Origin and Evolution of Deep Plasmaspheric Notches – 327

PLASTICS

A Hypothetical Perspective on the Relative Contributions of Strategic and Adaptive Control Mechanisms in Plastic Recalibration of Locomotor Heading Direction – 155

Polymerization Welding and Application to Microfluidics – 60

PLATING

Reduced Air Emissions for Hard Chrome Plating at the NADEP NAS North Island, San Diego Using an Alternative Emission Control Technology – 140

PLATINUM

National Transportation Safety Board Aircraft Accident Report: Runway Overrun and Collision, Platinum Jet Management, LLC, Bombardier Challenger CL-600-1A11, N370V, Teterboro, New Jersey, on February 2, 2005 – 6

PLETHYSMOGRAPHY

Design of a Wearable Respiratory Inductive Plethysmograph and Its Applications – 179

PLUTONIUM 238

Plutonium-238 Alpha-Decay Damage Study of the Ceramic Waste Form – 59

PLUTONIUM ALLOYS

Isothermal (Delta)/(Alpha-Prime) Transformation and TTT Diagram in a Plutonium Gallium Alloy – 38

PLUTONIUM

Fuel-Cladding Interaction Layers in Irradiated U-Zr and U-Pu Zr Fuel Elements – 40

Isothermal (Delta)/(Alpha-Prime) Transformation and TTT Diagram in a Plutonium Gallium Alloy – 38

PNEUMATICS

Investigations of Performance of Pneumatic Deicing Boots, Surface Ice Detectors, and Scaling of Intercycle Ice – 3

POLAR REGIONS

Application of NASA's Advanced Life Support Technologies in Polar Regions – 148

POLARITY

Restoration of Epithelial Polarity in Metastatic Tumors – 150

POLARIZATION (WAVES)

Threshold Resummation Effects in the Polarized Drell-Yan Process at GSI and J-PARC – 264

POLARIZATION

Methods to Calculate Corrosion Rates for Alloy 22 from Polarization Resistance Experiments – 50

POLICIES

A Methodology for Improving the Shipyard Planning Process: Using KVA Analysis, Risk Simulation and Strategic Real Options – 100

A Model-Driven Architecture Approach for Modeling, Specifying and Deploying Policies in Autonomous and Autonomic Systems – 224

Antigone: Implementing Policy in Secure Group Communication – 69

Defense Infrastructure: Continuing Challenges in Managing DOD Lodging Programs as Army Moves to Privatize Its Program – 122

Foundations in the Law: Classic Cases in Medical Ethics – 159

Ismene: Provisioning and Policy Reconciliation in Secure Group Communication – 69

Privacy Technology Focus Group: Executive Summary – 194

Privacy Technology Focus Group: Final Report and Recommendations – 194

POLITICS

A Need to Know: The Role of Air Force Reconnaissance in War Planning, 1945-1953 – 17

POLLUTION CONTROL

Method and System for Treating Contaminants and Ordors in Airborne Emissions – 138

Review of Hazardous Chemical Species Associated with CO2 Capture from Coal-Fired Power Plants and their Potential Fate during CO2 Geologic Storage – 136

POLLUTION MONITORING

Chemical Agent Detector – 139

Model Validation and Spatial Interpolation by Combining Observations with Outputs from Numerical Models via Bayesian Melding – 244

National Symposium on Recent Advances in Pollutant Monitoring of Ambient Air and Stationary Sources, Held at Raleigh, North Carolina May 3-6, 1983 – 138

Study of Stability Conditions in an Urban Area – 139

POLYGONS

Curve and Polygon Evolution Techniques for Image Processing – 199

POLYMERIC FILMS

High Energy Density Polymer Film Capacitors – 96

POLYMERIZATION

Polymerization Welding and Application to Microfluidics – 60

POLYMERS

Compression and Instrumented Indentation Measurements on Biomimetic Polymers – 40

Mobile Monolithic Polymer Elements for Flow Control in Microfluidic Devices – 102

Novel Hydrogels and Uses Thereof – 43

Polymeric Bioresorbable Composites Containing an Amorphous Calcium Phosphate Polymer Ceramic for Bone Repair and Replacement – 45

POLYMORPHISM

Dietary Heterocyclic Amines and Polymorphic Variants in the Etiology of Prostate Cancer – 160

POLYNOMIALS

A Technique for Speeding Up the Solution of the Lagrangean Dual – 192

PONDS

Ground-Water and Pond Levels, Cape Code, Massachusetts, 1950-82 – 123

POPULATIONS

Different Precursor Populations Revealed by Microsciouc Studies of Bulk Damage in KDP and DKDP Crystals – 43

Direct Measurement of Population-Induced Broadening of Quantum Well Intersubband Transitions – 284

POSEIDON SATELLITE

Multiresolution Optimal Interpolation and Statistical Analysis of Topex/Poseidon Satellite Altimetry – 238

POSITION INDICATORS

System Considerations of a Wide-Open, Crystal-Video, Two-Channel Direction Finder – 68

POSITION (LOCATION)

CARAVAN: Providing Location Privacy for VANET – 68

Drainage Areas of Streams at Selected Locations in Kentucky – 124

Methods and Systems for Detecting and Locating Damage in a Wire – 92

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 3: Multiple Plants at a Common Location. Report for January 20, 2005 to December 31, 2005 – 128

Numerical Skip-Entry Guidance – 32

Structures Including Network and Topology for Identifying, Locating and Quantifying Physical Phenomena – 39

The Effect of Microphone Placement on Localization Accuracy with Electronic Pass-Through Earplugs – 284

POSITRONS

Lu(sup 1)xI(sup 3):Ce(sup x): A Scintillator for Gamma Ray Spectroscopy and Time-Of Flight Pet – 266

Randomized Trial of Neuroprotective Effects of Erythropoietin in Patients Receiving Adjuvant Chemotherapy for Breast Cancer: Position Emission Tomography and NE – 171

Spin Rotation and Energy Compression in the ILC Linac-to-Ring Beamline – 276

Very Fast Doped LaBr(sup 3) Scintillators and Time-Of-Flight Pet – 266

POSTFLIGHT ANALYSIS

STS-114 Micrometeoroid/Orbital Debris (MMOD) Post-Flight Assessment – 330

POTASSIUM

Technology Development Program for an Advanced Potassium Rankine Power Conversion System Compatible with Several Space Reactor Designs – 28

POWDER (PARTICLES)

Powder Handling Device for Analytical Instruments – 113

POWER AMPLIFIERS

High Power Spatial Combiners: Tile and Tray Approaches – 99

POWER EFFICIENCY

A Comparison of Power-Efficient Broadcast Routing Algorithms – 132

A Novel Power-Efficient Broadcast Routing Algorithm Exploiting Broadcast Efficiency – 132

PRECIPITATION

Precipitation in Al-Zn-Mg-Cu Alloys Modified With Sc and Zr During Aging (Preprint) – 55

PREDICTION ANALYSIS TECHNIQUES

An Integrated High Resolution Hydrometeorological Modeling Testbed using LIS and WRF – 145

Crack Growth and Stress Intensity Prediction Techniques. Delivery Order 0027-1: Mixed Mode Failure Criteria – 281

Predictive Computations of Properties of Wide-Gap and Nano-Semiconductors – 100

Strictly Proper Scoring Rules, Prediction and Estimation – 255

PREDICTIONS

An Autonomous Glider Network for the Monterey Bay Predictive Skill Experiment / AOSN-II – 10

Predictive Computations of Properties of Wide-Gap and Nano-Semiconductors – 100

– 257

Uncertainty Analysis of Historical Hurricane Data – 145

PRESSURE BREATHING

Protection Effects of a New Combined Anti-G Measure – 175

PRESSURE DISTRIBUTION

Rotating Rake Mode Measurements Over Passive Treatment in a Ducted Fan – 283

PRESSURE EFFECTS

Effect of O2 Partial Pressure on YBa2Cu3O7-delta Thin Film Growth by Pulsed Laser Deposition – 54

Pressure Effects on Oxygen Concentration Flammability Thresholds of Materials for Aerospace Applications – 35

PRESTRESSING

Dynamic Preload as an Impact Protection Concept – 266

PREVENTION

Breast Cancer Prevention by Inducing Apoptosis in DCIS Using Breast Ductal Lavage – 168

Disclosure of Confidential Child Abuse and Neglect: Summary of State Laws – 195

Estrogen-Induced Depurination of DNA: A Novel Target for Breast Cancer Prevention – 173

Evaluating a Prefabricated Submerged Breakwater and Double-T Sill for Beach Erosion Prevention, Cape May Point, NJ – 147

How to Prevent Type-Flaw Guessing Attacks on Password Protocols – 215

Molecular Biology and Prevention of Endometrial Cancer – 170

Naked DNA Immunization of Prevention of Prostate Cancer in a Dunning Rat Prostate Tumor Model – 172

Soy and Tamoxifen for Breast Cancer Prevention in High Risk Pre-Menopausal Women – 171

PRISMS

Josephson Junction Triangular Prism Qubits Coupled to a Resonant LC Bus: Qubits and Gates for a Holonomic Quantum Computer – 96

PRIVACY

Preserving Privacy by De-identifying Facial Images – 74

Privacy Technology Focus Group: Executive Summary – 194

Privacy Technology Focus Group: Final Report and Recommendations – 194

PROBABILITY DENSITY FUNCTIONS

Using Bayesian Model Averaging to Calibrate Forecast Ensembles – 146

PROBABILITY DISTRIBUTION FUNCTIONS

Calibrated Probabilistic Forecasting at the Stateline Wind Energy Center: The Regime-Switching Space-Time (RST) Method – 147

Evaluating Shielding Effectiveness for Reducing Space Radiation Cancer Risks – 334

PROBABILITY THEORY

A Probabilistic Model for Uncertain Problem Solving – 189

Calibrated Probabilistic Forecasting Using Ensemble Model Output Statistics and Minimum CRPS Estimation – 241

Calibrated Probabilistic Mesoscale Weather Field Forecasting: The Geostatistical Output Perturbation (GOP) Method – 146

Can One Decide the Type of the Mean from the Empirical Measure? – 243

Probabilistic Thermal Analysis During Mars Reconnaissance Orbiter Aerobraking – 105

Verification Test Problems for the Calculation of Probability of Loss of Assured Safety in Temperature-Dependent Systems with Multiple Weak and Strong Links – 190

'Black-Box' Probabilistic Verification – 214

PROBLEM SOLVING

A Capacity Scaling Algorithm for the Constrained Maximum Flow Problem – 230

A Probabilistic Model for Uncertain Problem Solving – 189

Application of Theorem Proving to Problem Solving – 189

Distributed Decision and Communication Problems in Tactical USAF Command and Control – 69

Experiments in Evaluating Interactive Spoken Language Systems – 315

Fast Approximation Schemes for Multi-Criteria Flow, Knapsack, and Scheduling Problems – 230

The Inverse Source Problem for Maxwell's Equations – 231

PROCEDURES

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of Codes, Standards, and Practices in Use at the Time of the Design and Construction of World Trade Center 1, 2, and 7. NIST NCSTAR 1-1E – 118

PROCUREMENT

Cost Valuation: A Model for Comparing Dissimilar Aircraft Platforms – 19

Industry Analysis for Body Armor Procurement – 186

PROGRAM VERIFICATION (COMPUTERS)

'Black-Box' Probabilistic Verification – 214

PROGRAMMING LANGUAGES

Evaluating Co-Array Fortran and Unified Parallel C – 206

PROGRESS

The Rate of Progress in Natural Language Processing – 316

PROJECTILES

Application of Computational Fluid Dynamics to a Preliminary Extended Area Protection System (EAPS) Projectile – 102

Procedure for Near-Simultaneous Testing – 113

PROJECTORS

Dynamic IR Scene Projector Based Upon the Digital Micromirror Device – 75

PROPAGATION

Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 325

PROPELLANT TANKS

Runtime and Pressurization Analyses of Propellant Tanks – 36

PROPELLANTS

Runtime and Pressurization Analyses of Propellant Tanks – 36

PROPHYLAXIS

Glycopetide-Based Immunotherapy for Prophylaxis and Treatment of Mammary Adenocarcinomas – 149

Lymphedema Prophylaxis Utilizing Perioperative Education – 159

Prophylactic Effects of Choline Chloride on Muscle Atrophy in Tail-suspended Rats – 177

PROPORTIONAL CONTROL

A Bearingless Switched-Reluctance Motor for High Specific Power Applications – 23

PROPORTIONAL COUNTERS

PNNL OS3700 Tritium Monitoring System Software and Hardware Operations Manual Rev. 0 – 197

PROPULSION SYSTEM CONFIGURATIONS

The Art of Extracting One-Dimensional Flow Properties from Multi-Dimensional Data Sets – 24

PROPULSION SYSTEM PERFORMANCE

The Art of Extracting One-Dimensional Flow Properties from Multi-Dimensional Data Sets – 24

PROPULSION

Responding to Mechanical Antigravity – 37

PROSTATE GLAND

A Phase I/II Study of Combination Neoadjuvant Hormone Therapy and Weekly OGX-011 Prior to Radical Prostatectomy in Patients with Localized Prostate Cancer – 153

Dietary Determinants of Prostate Cancer – 170

Dietary Heterocyclic Amines and Polymorphic Variants in the Etiology of Prostate Cancer – 159

Facilitating Treatment Decision Making, Adjustment, and Coping in Men Newly Diagnosed with Prostate Cancer. Addendum – 164

Inhibitory Ah Receptor-Androgen Receptor Crosstalk in Prostate Cancer – 170

Lysophosphatidic Acid Regulation and Roles in Human Prostate Cancer – 154

Molecular Mechanisms of Prostate Cancer Progression – 171

Naked DNA Immunization of Prevention of Prostate Cancer in a Dunning Rat Prostate Tumor Model – 172

Nuclear Imaging for Assessment of Prostate Cancer Gene Therapy – 158

Prostate Derived Ets Factor, an Immunogenic Breast Cancer Antigen – 166

Role of Estrogen Metabolism in the Initiation of Prostate Cancer: Biomarkers of Susceptibility and Early Detection – 153

The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer – 157

The Role of C-SRC Activation in Prostate Tumor Progression – 153

Using Genetically Engineered Mice to Probe the Role of Bioactive Lipids in Prostate Carcinogenesis – 157

PROTECTION

Application of Computational Fluid Dynamics to a Preliminary Extended Area Protection System (EAPS) Projectile – 102

Disclosure of Confidential Child Abuse and Neglect: Summary of State Laws – 195

Dynamic Preload as an Impact Protection Concept – 266

Protection Effects of a New Combined Anti-G Measure – 174

Using Human Systems Integration and Knowledge Engineering to Define and Design Anti-Terrorism/Force Protection Systems and Solutions – 183

PROTECTIVE CLOTHING

Design of a Wearable Respiratory Inductive Plethysmograph and Its Applications – 179

Forced Ventilation of Protective Garments for Hot Industries – 185

Mass Properties and Inertial Loading Effects of Head Encumbering Devices – 181

PROTECTIVE COATINGS

Combustion Turbine (CT) Hot Section Coating Life Management. (Final Report) – 60

PROTEINS

Fully Virulent Bacillus Anthracis Does Not Require the Immunodominant Protein BclA for Pathogenesis – 164

Neural Protein Synuclein (SNCG) in Breast Cancer Progression – 149

Soy and Tamoxifen for Breast Cancer Prevention in High Risk Pre-Menopausal Women – 171

PROTOCOL (COMPUTERS)

A Near-Optimum Channel Access Protocol Based on Incremental Collision Resolution and Distributed Transmission Queues – 217

A Novel Group Coordination Protocol for Collaborative Multimedia Systems – 193

Comparison of Floor Control Protocols for Collaborative Multimedia Environments – 337

Development of multi service provisioning platform in synchronous digital hierarchy systems – 199

Efficacy of Floor Control Protocols in Distributed Multimedia Collaboration – 337

Electrotechnical Review, Volume 73, No.4 – 75

E-LOTOS-Based Compositional Service-Based Synthesis of Multi-Party Time-Sharing-Based Protocols – 77

Floor Acquisition Multiple Access with Collision Resolution – 216

How to Prevent Type-Flaw Guessing Attacks on Password Protocols – 215

Protocol Independence through Disjoint Encryption – 212

Semantic Web Rule Languages – 213

Softswitch Architecture Remodelling for New Generation IP Multimedia Subsystem Environment – 79

Throughput and Fairness of Collision Avoidance Protocols in Ad Hoc Networks – 6

PROTONS

Comparative Studies of Proton Accelertors for High Power Applications – 275

Proposal for an Experimental Program in Neutrino Physics and Proton Decay in the Homestake Laboratory – 274

Spin Structure Functions: Proton/Deuteron Measurements in the Resonance Region – 276

Transverse Imaging of the Proton in Exclusive Diffractive PP Scattering – 279

PROTOTYPES

Fluorescence Visualization of Hypersonic Flow over Rapid Prototype Wind-Tunnel Models – 4

Improving Human Interfaces in Military Simulation Applications – 210

PROVING

Proof of Correctness of Proposed ATM Retransmission Scheme – 193

Ultra Small Aperture Terminal (USAT) Phased Array Technology Demonstrator – 99

Verification Test Problems for the Calculation of Probability of Loss of Assured Safety in Temperature-Dependent Systems with Multiple Weak and Strong Links – 190

PROVISIONING

Ismene: Provisioning and Policy Reconciliation in Secure Group Communication – 69

PSYCHOLINGUISTICS

Cognitive and Emotive Empathy in Discourse: Towards an Integrated Theory of Mind – 221

Virtual Rapport – 218

PSYCHOLOGY

Commonsense Psychology and the Functional Requirements of Cognitive Models – 219

Mitigation Theory: An Integrated Approach – 249

PSYCHOMOTOR PERFORMANCE

Effects of Speed and Visual-Target Distance on Toe Trajectory During the Swing Phase of Treadmill Walking – 157

Locomotor Dysfunction after Spaceflight: Characterization and Countermeasure Development – 151

PSYCHOPHYSIOLOGY

Speed-Accuracy Tradeoff in Olfaction – 156

PSYCHOTHERAPY
A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

PULSARS
Future Gamma-Ray Observations of Pulsars and their Environments – 321

PULSE COMMUNICATION
Digital Learning Network Education Events of NASA's Extreme Environments Mission Operations – 331

PULSE DETONATION ENGINES
Pulse Detonation Physiochemical and Exhaust Relaxation Processes – 24

PULSED LASER DEPOSITION
Effect of O2 Partial Pressure on YBa2Cu3O7-delta Thin Film Growth by Pulsed Laser Deposition – 54

PULSED LASERS
Effect of O2 Partial Pressure on YBa2Cu3O7-delta Thin Film Growth by Pulsed Laser Deposition – 54

Investigation of Temporal Contrast Effects in Femtosecond Pulse Laser Micromachining of Metals – 291

PULSED RADIATION
An Optimization of Pulsed ElectroMagnetic Fields Study – 156

PULSEJET ENGINES
Pulse Detonation Physiochemical and Exhaust Relaxation Processes – 24

PURITY
Performances of High Purity Niobium Cavities with Different Grain Sizes – 258

QUADRATIC PROGRAMMING
An Optimal Parallel Implementation of a Quadratic Transportation Algorithm – 206

QUADRATURES
Wave Based Inversion and Imaging for the Optical Quadrature Microscope – 290

QUALITY CONTROL
Accelerating PV Cost Effectiveness Through Systems Design, Engineering, and Quality Assurance. Phase 1 Annual Technical Report, November 4, 2004-November 3, 2005 – 130

Remedial Investigation and Feasibility Study of the Defense Property Disposal Office, Fort George G. Meade, Maryland. Final Quality Control Plan – 315

QUANTUM CASCADE LASERS
FY 2005 Quantum Cascade Laser Alignment System. Final Report – 290

QUANTUM CHEMISTRY
Efficient Execution of Electronic Structure Calculations on SMP Clusters – 48

QUANTUM CHROMODYNAMICS
New Perspectives for QCD From AdS/CFT – 259

Probing QCD with Rare Charmless B Decays – 263

Threshold Resummation Effects in the Polarized Drell-Yan Process at GSI and J-PARC – 264

QUANTUM DOTS
A Multi-Josephson Junction Qubit – 298

A Quantum Dot Optical Modulator for Integration With Si CMOS – 88

Improved Temperature Characteristics in Quantum Dot Lasers with Indirect-Bandgap Barriers – 97

QUANTUM THEORY
Direct Measurement of Population-Induced Broadening of Quantum Well Intersubband Transitions – 284

QUANTUM WELL LASERS
Performance Improvement in Quantum Well Lasers by Optimizing Band Gap Offset at Quantum Well Heterojunctions – 111

Sub-100 muA Current Operation of Strained InGaAs Quantum Well Lasers at Low TemperaturesL – 111

QUANTUM WELLS
Control of Electric Field Domain Formation in Multiquantum Well Structures – 281

Direct Measurement of Population-Induced Broadening of Quantum Well Intersubband Transitions – 284

Performance Improvement in Quantum Well Lasers by Optimizing Band Gap Offset at Quantum Well Heterojunctions – 111

Quantum Interference Effect and Electric Field Domain Formation in Quantum Well Infrared Photodetectors – 109

The Effect of Temperature on the Resonant Tunneling and Electric Field Domain Formation in Multiple Quantum Well Superlattices – 296

Voltage-Controlled Tunable GaAs/AlGaAs Multistack Quantum Well Infrared Detector – 108

QUASI-BIENNIAL OSCILLATION
Modeling the Observed Solar Cycle Variations of the Quasi-biennial Oscillation (QBO): Amplification by Wave Forcing – 144

QUERY LANGUAGES
High Performance Visualization using Query-Driven Visualization and Analytics – 188

QUEUEING THEORY
UMass at TREC 2002: Cross Language and Novelty Tracks – 228

RACE FACTORS
Increasing Breast Cancer Surveillance Among African American Breast Cancer Survivors – 150

RADAR MEASUREMENT
Turbulence and Mountain Wave Conditions Observed with an Airborne 2-Micron Lidar – 19

RADAR TRACKING
A Deception Repeater for Conical-Scan Automatic Tracking Radars – 108

RADAR TRANSMITTERS
A HF Pulsed Transmitter for an Experimental Cross-Correlation Radar System – 108

A Wide-Band Video Noise Source, 50 KC to 10 MC – 108

RADIANT HEATING
Validation Experiments to Determine Radiation Partitioning of Heat Flux to an Object in a Fully Turbulent Fire – 104

RADIATION BELTS
Radiation and Plasma Environments for Lunar Missions – 333

RADIATION DISTRIBUTION
Inverse Compton Emission from Galactic Supernova Remnants: Effect of the Interstellar Radiation Field – 322

RADIATION DOSAGE
Evaluating Shielding Effectiveness for Reducing Space Radiation Cancer Risks – 334

RADIATION EFFECTS
Inverse Compton Emission from Galactic Supernova Remnants: Effect of the Interstellar Radiation Field – 322

RADIATION MEASUREMENT
Validation of the Archived CERES Surface and Atmosphere Radiation Budget (SARB) at SGP – 142

RADIATION SHIELDING
Evaluating Shielding Effectiveness for Reducing Space Radiation Cancer Risks – 334

Supplemental Release Limits for the Directed Reuse of Steel in Road Barriers and Lead in Shielding Products by the Department of Energy – 318

RADIATION
Technical Basis Document for Natural Event Hazards – 136

RADIATIVE HEAT TRANSFER
Validation Experiments to Determine Radiation Partitioning of Heat Flux to an Object in a Fully Turbulent Fire – 104

RADIATIVE TRANSFER
Global, Multi-Year Analysis of Clouds and Earth's Radiant Energy System Terra Observations and Radiative Transfer Calculations – 142

RADIO COMMUNICATION
EM Threat Analysis for Wireless Systems – 71

RADIO DIRECTION FINDERS
A Wide-Aperture HF Direction-Finder with Sleeve Antennas – 67

System Considerations of a Wide-Open, Crystal-Video, Two-Channel Direction Finder – 68

RADIO FREQUENCIES
High Gradient Operation with the CEBAF Upgrade RF Control System – 269

Low-Voltage Infrared Free-Electron Lasers Based on Gyrotron-Powered RF Wigglers – 111

Multiscale Representations of Markov Random Fields – 247

Muon Cooling RF R and D Program – 277

Performance Analysis of Adaptive Transmission Aided by Long Range Channel Prediction for Realistic Single- and Multi-Carrier Mobile Radio Channels – 71

Radio Frequency Applications of Barium Strontium Titanate Thin Film Tunable Capacitors – 96

Radio-Frequency Driven Dielectric Heaters for Non-Nuclear Testing in Nuclear Core Development – 285

RADIO JETS (ASTRONOMY)

Black Hole Spectral States and Physical Connections – 322

RADIO OBSERVATION

GRO J1655-40: Early Stages of the 2005 Outburst – 320

RADIO TRANSMITTERS

Positionering av Radiosaendare i Svar Radionmiljoe (Radio DF in Difficult Environment) – 68

RADIOACTIVE WASTES

Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository – 51

LLNL Heavy Element Facility-Facility Management, Authorization Basis, and Readiness Assessment Lessons Learned in the Heavy Element Facility (B251) Transition from Category II Nuclear Facility to Radiological Facility – 137

RADIOGENIC MATERIALS

Ar-39-Ar-40 Ages of Two Nakhlites, MIL03346 and Y000593: A Detailed Analysis – 327

RADIOGRAPHY

Phase Effects on Mesoscale Object X-ray Attenuation Radiographs – 259

RADIOISOTOPE BATTERIES

Test Report on the November 2005 NATO RTG-40 Active Imager Land Field Trials – 108

RADIOLOGY

LLNL Heavy Element Facility-Facility Management, Authorization Basis, and Readiness Assessment Lessons Learned in the Heavy Element Facility (B251) Transition from Category II Nuclear Facility to Radiological Facility – 137

RADIOMETERS

Ar-39-Ar-40 Ages of Two Nakhlites, MIL03346 and Y000593: A Detailed Analysis – 327

RADIOTELEPHONES

Design Issues on Broadcast Routing Algorithms using Realistic Cost-Effective Smart Antenna Models – 238

RAMAN SPECTRA

Fiber Optic Raman Sensor to Monitor Concentration Ratio of Nitrogen and Oxygen in a Cryogenic Mixture – 286

RANDOM ACCESS MEMORY

Bias-Adjusted Giant Magnetoresistive (GMR) Devices for Magnetic Random Access Memory (MRAM) Applications – 70

RANDOM NOISE

Enhancement of Stochastic Resonance Using Optimization Theory – 249

RANGEFINDING

Live Modeling of a Dyna Vision SPR-02 Sensor for Rangefinding Application – 110

RANKINE CYCLE

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 2: Comparison of Wet and Dry Rankine Cycle Heat Rejection. Report for January 20, 2005 to December 31, 2005 – 128

Scaling of Thermal-Hydraulic Experiments for a Space Ranking Cycle and Selection of a Preconceptual Scaled Experiment Design – 285

Technology Development Program for an Advanced Potassium Rankine Power Conversion System Compatible with Several Space Reactor Designs – 27

RAPID PROTOTYPING

Extending NASA Research Results to Benefit Society: Rapid Prototyping for Coastal Applications – 126

RARE EARTH ELEMENTS

Rare-earth Transition-Metal Intermetallics: Structure-Bonding-Property Relationships – 48

RATS

Effects of Tail Suspension on Renin-angiotensin System in Rat Myocardium – 177

Naked DNA Immunization of Prevention of Prostate Cancer in a Dunning Rat Prostate Tumor Model – 172

Prophylactic Effects of Choline Chloride on Muscle Atrophy in Tail-suspended Rats – 177

Protective Effects of Vitamin E on Injury to Male Reproductive Function in Tail-suspended Rats – 179

REACTION

State of the Art in Anomaly Detection and Reaction – 124

REACTIVITY

Electron Transfer Reactivity Patterns at Chemically Modified Electrodes: Fundamentals and Application to the Optimization of Redox Recycling Amplification Systems – 49

Reactive Materials and Thermal Spray Methods of Making Same – 56

REACTOR DESIGN

Technology Development Program for an Advanced Potassium Rankine Power Conversion System Compatible with Several Space Reactor Designs – 28

REAL NUMBERS

A High-Level Formalization of Floating-Point Number in PVS – 204

REAL TIME OPERATION

Communications System Based on Real-Time Neurophysiological Characterization – 70

New Real-time Modeling and Simulation Products and Applications – 191

Nonverbal Behavior Generator for Embodied Conversational Agents – 204

Real Time Flux Control in PM Motors – 84

Real-Time High-Dynamic Range Texture Mapping – 199

Sensor to User - NASA/EOS Data for Coastal Zone Management Applications Developed from Integrated Analyses: Verification, Validation and Benchmark Report – 125

STRATA: Observer-based Measurement Agent Research Support – 64

RECEIVERS

Measured Effects of a Narrowband Interference Suppressor on GPS Receivers – 99

Trough Receiver Heat Loss Testing – 129

RECONNAISSANCE

A Need to Know: The Role of Air Force Reconnaissance in War Planning, 1945-1953 – 17

RECURSIVE FUNCTIONS

Multiscale Representations of Markov Random Fields – 243

RECYCLING

Electron Transfer Reactivity Patterns at Chemically Modified Electrodes: Fundamentals and Application to the Optimization of Redox Recycling Amplification Systems – 49

REDUNDANCY

On-Line Fault Detection and Isolation Using Analytical Redundancy – 80

Optimally Robust Redundancy Relations for Failure Detection in Uncertain Systems – 216

REENTRY VEHICLES

Fluorescence Visualization of Hypersonic Flow over Rapid Prototype Wind-Tunnel Models – 4

REFLECTANCE

Characterization of Lubricants on Ball Bearings by FT-IR Using an Integrating Sphere – 52

REFLECTOMETERS

Natural Fiber Spin Reflectometer Providing a Virtual Differential Signal Sensing Array Capability – 289

REFRACTIVITY
Wave Based Inversion and Imaging for the Optical Quadrature Microscope – 290

REFRACTORY METAL ALLOYS
High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems – 57

REFRIGERANTS
Floating Refrigerant Loop Based on R-134a Refrigerant Cooling of High-Heat Flux Electronics – 86

REFRIGERATING
Nanoscale Devices for Solid State Refrigeration and Power Generation – 133

Nature of the Distinctive Microscopic Features in R5(SIxGe1-x)4 Magnetic Refrigeration Materials – 38

REGENERATION (PHYSIOLOGY)
An Optimization of Pulsed ElectroMagnetic Fields Study – 156

Effect of Chimaerins, Novel Receptors for Phorbol Esters, on Breast Cancer Cell Proliferation and Cell Cycle Progression – 165

REGENERATIVE COOLING
Development of GRCop-84 for Rocket Engine Applications – 56

REGENERATORS
Recuperator Assembly and Procedures – 23

REGISTERS (COMPUTERS)
Smart Register Files for High-Performance Microprocessors – 215

REGRESSION ANALYSIS
Bagging Regularizes – 246

Multi-Scale Autoregressive Processes – 242

Vector-Valued Support Vector Regression – 192

REGULATORS
Rational Design of Regulators of Programmed Cell Death in Human Breast Cancer – 163

Series Connected Buck-Boost Regulator – 87

RELATIONAL DATA BASES
On Developing Theory and Application of Community Generation – 256

The Database as Model: A Metatheoretic Approach – 314

RELATIVISTIC EFFECTS
Relativistic Effects on the Equation of State of the Light Actinides – 279

RELATIVISTIC PARTICLES
Evaluating Shielding Effectiveness for Reducing Space Radiation Cancer Risks – 334

RELAXATION METHOD (MATHEMATICS)
A Technique for Speeding Up the Solution of the Lagrangean Dual – 192

RELIABILITY ANALYSIS
Performance Analysis of Adaptive Transmission Aided by Long Range Channel Prediction for Realistic Single- and Multi-Carrier Mobile Radio Channels – 71

Performance Analysis of Poll-Based Retransmission Schemes – 336

RELIABILITY
Development of a Non-Linear Element Code for the Improvement of Piezoelectric Actuator Design and Reliability – 88

Importance of Cooling System Optimization with Regard to Lifetime and Reliability of Power Transformers – 76

RELUCTANCE
Interior Permanent Magnet Reluctance Machine with Brushless Field Excitation – 85

REMOTE SENSING
Extending NASA Research Results to Benefit Society: Rapid Prototyping for Coastal Applications – 126

Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 125

Model Calculations of Solar Spectral Irradiance in the 3.7 Micron Band for Earth Remote Sensing Applications – 141

Sensor to User - NASA/EOS Data for Coastal Zone Management Applications Developed from Integrated Analyses: Verification, Validation and Benchmark Report – 125

Titan Orbiter with Aerorover Mission (TOAM) – 319

RENDEZVOUS TRAJECTORIES
Lessons Learned From Seven Space Shuttle Missions – 33

RENIN
Effects of Tail Suspension on Renin-angiotensin System in Rat Myocardium – 177

REPEATERS
A Deception Repeater for Conical-Scan Automatic Tracking Radars – 108

REPLACING
Electron Beam Freeform Fabrication in the Space Environment – 319

Polymeric Bioresorbable Composites Containing an Amorphous Calcium Phosphate Polymer Ceramic for Bone Repair and Replacement – 45

REPRESENTATIONS
Investigating Shape Representation in Area V4 with HMAX: Orientation and Grating Selectivities – 224

REQUIREMENTS
High Altitude Long Endurance Air Vehicle Analysis of Alternatives and Technology Requirements Development – 14

Intrusion Detection System Requirements. A Capabilities Description in Terms of the Network Monitoring and Assessment Module of CSAP21 – 215

Specification for Visual Requirements of Work-Centered Software Systems – 211

RESEARCH AND DEVELOPMENT
ILC Linac R and D at SLAC – 276

LFR Lead Cooled Fast Ractor – 270

Muon Cooling RF R and D Program – 277

Research of Biomechanical Evaluation Methods of Hand Performance Fatigue – 178

Research on ECG Denoising during Spaceflight – 177

Robotic Follower Experimentation Results – 221

The Passive Countermeasures Program at the Naval Research Laboratory – 335

RESEARCH MANAGEMENT
Epidemic Outbreak Surveillance (EOS) – 168

RESEARCH PROJECTS
The USAF Electric Propulsion Research Program (Postprint) – 88

RESEARCH
NERL Air Quality Research: Moving Forward. EPA-NOAA Scientists-to-Scientists Meeting. Held on March 2-3, 2004 – 137

RESERVOIRS
Leakage from Geologic Storage Reservoirs of CO2 – 137

RESONANCE
Enhancement of Stochastic Resonance by Tuning System Parameters and Adding Noise Simultaneously – 248

RESONANT TUNNELING
The Effect of Temperature on the Resonant Tunneling and Electric Field Domain Formation in Multiple Quantum Well Superlattices – 296

RESOURCES MANAGEMENT
Risk-Based Decision Support of Water Resource Management Alternatives – 251

RESPIRATION
Design of a Wearable Respiratory Inductive Plethysmograph and Its Applications – 179

RESPIRATORY DISEASES
Epidemic Outbreak Surveillance (EOS) – 168

RESPONSES
Information Warfare and International Law – 315

Investigation of the Effects of Restraint Design Variations on Human Responses to Impact – 182

Response Surface Methodology – 232

State of the Art in Anomaly Detection and Reaction: An Update – 207

RESTORATION

Biological Restoration of Major Transportation Facilities Domestic Demonstration and Application Project (DDAP): Technology Develop(ment aat Sandia National Laboratories – 60

Hierarchical Reconstruction Using Geometry and Sinogram Restoration – 193

Restoration of Epithelial Polarity in Metastatic Tumors – 150

RESUSCITATION

Annual Safar Symposium (3rd) Held at University of Pittsburgh School of Medicine on 23 June 2005 – 158

RETINA

Bucky Paper as a Support Membrane in Retinal Cell Transplantation – 149

In-vivo Imaging of the Photoreceptor Mosaic in Retinal Dystrophies and Correlation with Visual Function – 290

RETROREFLECTORS

FY 2005 Miniature Spherical Retroreflectors Final Report – 258

REYNOLDS NUMBER

Progress in Flaps Down Flight Reynolds Number Testing Techniques at the NTF – 12

RIBONUCLEIC ACIDS

Dysregulation of RNA Interference in Breast Cancer – 167

Effect of Chimaerins, Novel Receptors for Phorbol Esters, on Breast Cancer Cell Proliferation and Cell Cycle Progression – 165

RICCATI EQUATION

Generalized Riccati Equations for Two-Point Boundary-Value Descriptor Systems – 231

RIPPLES

Modulation in Stator Flux Control of Induction Motor for Reduced Torque Ripple – 77

RISK

A Methodology for Improving the Shipyard Planning Process: Using KVA Analysis, Risk Simulation and Strategic Real Options – 100

Bone Geometry as a Predictor of Tissue Fragility and Stress Fracture Risk – 151

Central Leptin Gene Therapy to Reduce Breast Cancer Risk Factors – 166

Evaluating Shielding Effectiveness for Reducing Space Radiation Cancer Risks – 334

Information Warfare Arms Control: Risks and Costs – 316

ORA: Organization Risk Analyzer – 210

Public-Private Partnerships for Government Financing, Controlling Risk, and Value-for-Money: The UK Experience – 317

Risk Bounds for Mixture Density Estimation – 246

Risk Driven Outcome-Based Command and Control (C2) Assessment – 66

Risk Management and Medical Liability: A Manual for Indian Health Service and Tribal Health Care Professionals. Second Edition – 304

Risk-Based Decision Support of Water Resource Management Alternatives – 250

Sensitivity in Risk Analyses with Uncertain Numbers – 191

Soy and Tamoxifen for Breast Cancer Prevention in High Risk Pre-Menopausal Women – 171

Statistical Learning: Stability is Sufficient for Generalization and Necessary and Sufficient for Consistency of Empirical Risk Minimization – 256

The Role of Dosimetry in High-Quality EMI Risk Assessment – 140

RIVERS

Risk-Based Decision Support of Water Resource Management Alternatives – 251

ROADS

Phase I Cultural Resources Survey and Archeological Inventory of a Proposed 1.12 ha (2.87 ac) Borrow Pit and an Associated Access Road, Ascension Parish, Louisiana – 127

Supplemental Release Limits for the Directed Reuse of Steel in Road Barriers and Lead in Shielding Products by the Department of Energy – 318

ROBOTICS

Adaptive Division of Labor in Large-Scale Minimalist Multi-Robot Systems – 224

Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative – 311

Robotic Follower Experimentation Results – 221

Robotic Technologies for the Future Force - The ART STO – 223

The Bekker Model Analysis for Small Robotic Vehicles – 229

ROBOTS

A Framework for Learning Declarative Structure – 239

Adaptive Division of Labor in Large-Scale Minimalist Multi-Robot Systems – 224

Designing a Self-Stabilizing Robot for Dynamic Mobile Manipulation – 225

Development of a Portable Simulator for Training Robot Assisted Surgery – 220

Intelligent Mobility Laboratory – 66

Monitored Execution of Robot Plans Produced by Strips – 221

Toward a Multi-Robot Coordination Formalism – 224

Towards a Factored Analysis of Legged Locomotion Models – 229

ROCKET ENGINES

Development of GRCop-84 for Rocket Engine Applications – 56

ROCKET TEST FACILITIES

Overview of Engineering Design and Analysis at the NASA John C. Stennis Space Center – 22

ROCKS

JLAB Ampere-Clast Cryomodule Conceptual Design – 260

ROLL

Angle Measurement System (AMS) for Establishing Model Pitch and Roll Zero, and Performing Single Axis Angle Comparisons – 25

ROTATION

Rotating Rake Mode Measurements Over Passive Treatment in a Ducted Fan – 283

Spin Rotation and Energy Compression in the ILC Linac-to-Ring Beamline – 276

ROTOR BLADES (TURBOMACHINERY)

Effect of the FlashJet Paint Removal System on Rotor Blade Skin Materials – 39

RUBBER

Performance Comparison of Hot Rubber Crack Sealants to Emulsified Asphalt Crack Sealants – 42

RUBIDIUM ISOTOPES

Rb-Sr and Sm-Nd Isotopic Studies of Martian Depleted Shergottes SaU 094/005 – 327

RUBIDIUM

Sm-Nd and Rb-Sr Ages for MIL 05035: Implications for Surface and Mantle Sources – 331

RUNWAYS

National Transportation Safety Board Aircraft Accident Report: Runway Overrun and Collision, Platinum Jet Management, LLC, Bombardier Challenger CL-600-1A11, N370V, Teterboro, New Jersey, on February 2, 2005 – 6

RUSSIAN FEDERATION

Development of Controlled Ecological Life-support System in Russia – 176

SAFETY MANAGEMENT

National Transportation Safety Board Aircraft Accident Report: Runway Overrun and Collision, Platinum Jet Management, LLC, Bombardier Challenger CL-600-1A11, N370V, Teterboro, New Jersey, on February 2, 2005 – 6

SAFETY

Collision Avoidance for Unmanned Aircraft: Proving the Safety Case – 7

Energy Absorber for Vehicle Occupant Safety and Survivability – 184

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Amendments to the Fire Protection and Life Safety Provisions of the New York City Building Code by Local Laws Adopted While World Trade Center 1, 2, and 7 Were in Use. NIST NCSTAR 1-1G – 121

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design, Construction, and Maintenance of Structural and Life Safety Systems. NIST NCSTAR 1-1 – 299

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Fire Protection and Life Safety Provisions Applied to the Design and Construction of WTC 1, 2, 7 and Post-Construction Provisions Applied After Occupancy. NIST NCSTAR 1-1D – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety, and Structural Systems of World Trade Center 7. NIST NCSTAR 1-1I – 120

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety Systems of the World Trade Center Towers. NIST NCSTAR 1-1H – 121

National Transportation Safety Board Aircraft Accident Report: Runway Overrun and Collision, Platinum Jet Management, LLC, Bombardier Challenger CL-600-1A11, N370V, Teterboro, New Jersey, on February 2, 2005 – 6

Safety and Usability of Speech Interfaces for In-Vehicle Tasks while Driving: A Brief Literature Review – 184

Status of Physics and Safety Analyses for the Liquid Salt Cooled Very High Temperature Reactor (LS-VHTR) – 285

Thermally-Related Safety Issues Associated with Thermal Batteries – 130

Verification Test Problems for the Calculation of Probability of Loss of Assured Safety in Temperature-Dependent Systems with Multiple Weak and Strong Links – 190

SAMARIUM ISOTOPES

Rb-Sr and Sm-Nd Isotopic Studies of Martian Depleted Shergottes SaU 094/005 – 327

Sm-Nd Isotopic Systematics of Troctolite 76335 – 330

SAMARIUM

Sm-Nd and Rb-Sr Ages for MIL 05035: Implications for Surface and Mantle Sources – 331

SAMPLE RETURN MISSIONS

Decontamination of Genesis Array Materials by UV Ozone Cleaning – 329

Genesis Silicon Carbide Concentrator Target 60003 Preliminary Ellipsometry Mapping Results – 329

SAMPLED DATA SYSTEMS

Some Issues at Sampled-Data Identification and Conversion of the Identified Models into the Continuous-Time Domain – 75

SAMPLING

Adaptive Sampling and Analysis Programs (ASAPs) – 51

Analysis of PMD Compensators With Fixed DGD Using Importance Sampling – 98

Easy Computation of Bayes Factors and Normalizing Constants for Mixture Models via Mixture Importance Sampling – 245

Installation and Sampling of Observation Wells and Analyses of Water From the Shallow Aquifer at Selected Waste-Disposal Sites in the Memphis Area, Tennessee – 123

Model-Based Clustering for Image Segmentation and Large Datasets Via Sampling – 189

On Sampling Methods and Annealing Algorithms – 192

Passive Badge Assessment for Long-Term, Low-Level Air Monitoring on Submarines: VOC Badge Validation – 44

Survey of Sampling-Based Methods for Uncertainty and Sensitivity Analysis – 242

The Normal Kernel Coupler: An Adaptive Markov Chain Monte Carlo Method for Efficiently Sampling From Multi-Modal Distributions – 232

SATELLITE ALTIMETRY

Multiresolution Optimal Interpolation and Statistical Analysis of Topex/Poseidon Satellite Altimetry – 238

SATELLITE COMMUNICATION

Ultra Small Aperture Terminal (USAT) Phased Array Technology Demonstrator – 100

SATELLITE IMAGERY

Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 125

SATELLITE OBSERVATION

Comparison of Satellite Observations of Nitrogen Dioxide to Surface Monitor Nitrogen Dioxide Concentration – 135

Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 125

SATURATION

Time-Lapse Seismic Modeling and Inversion Modeling and Inversion of CO2 Saturation for Sequestration and Enhanced Oil Recovery – 136

SCALING

A Capacity Scaling Algorithm for the Constrained Maximum Flow Problem – 230

SCANNERS

Metamaterial Scanning Lens Antenna Systems and Methods – 71

Vertically Aligned Nanostructure Scanning Probe Microscope Tips – 41

SCATTERING

Experimental Studies of IBS in RHIC and Comparison with Theory – 262

Intrabeam Scattering in the NLC Main Damping Rings – 270

Radiation and Scattering Compact Antenna Laboratory – 97

Summary of Beam Cooling and Intrabeam Scattering – 261

Transverse Imaging of the Proton in Exclusive Diffractive PP Scattering – 279

SCHEDULING

A Personalized Calendar Assistant – 312

Communications System Based on Real-Time Neurophysiological Characterization – 70

Fast Approximation Schemes for Multi-Criteria Flow, Knapsack, and Scheduling Problems – 230

Rollout Algorithms for Stochastic Scheduling Problems – 234

SCIENCE

Scientific Data Management Center – 190

SCIENTIFIC VISUALIZATION

High Performance Visualization using Query-Driven Visualization and Analytics – 188

SCINTILLATION COUNTERS

Lu(sup 1)xI(sup 3):Ce(sup x): A Scintillator for Gamma Ray Spectroscopy and Time-Of Flight Pet – 266

Very Fast Doped LaBr(sup 3) Scintillators and Time-Of-Flight Pet – 266

SCORING

Standardized UXO Technology Demonstration Site Open Field Scoring Record No. 802 – 336

Strictly Proper Scoring Rules, Prediction and Estimation – 255

SEALERS

Performance Comparison of Hot Rubber Crack Sealants to Emulsified Asphalt Crack Sealants – 42

SEALING

Performance Comparison of Hot Rubber Crack Sealants to Emulsified Asphalt Crack Sealants – 42

SEAS

Use of Stochastic Modeling of Stratigraphic Relationships in High Resolution Seismic Reflection Data for Prediction of the Distribution of Acoustic and Geotechnical Property Variability in Near Surface Sediments on the East China Sea Continental Margin – 127

SECONDARY EMISSION

Studies of E-Cloud Build up the the FNAL Main Injector and for the LHC – 265

SECURITY

Assessment of Access Control Systems – 195

Cross-Layer Design for Energy-Efficient Secure Multicast Communications in Ad Hoc Networks – 132

Defense in Depth: Foundation for Secure and Resilient IT Enterprises – 218

Hierarchical Role-based Viewing for Multi-level Information Security in Collaborative CAD – 307

Power System Dynamic Security Assessment using Digital Simulation – 76

Secure Broadcast in Energy-Aware Wireless Sensor Networks – 131

Security Guards for the Future Web – 214

The National Biodefense Analysis and Countermeasures Center: Issues for Congress – 152

U.S. Security Posture in the Middle East: Need for a Change – 336

Using Computer Games to Train Information Warfare Teams – 208

Using Human Systems Integration and Knowledge Engineering to Define and Design Anti-Terrorism/Force Protection Systems and Solutions – 183

VP3: Using Vertex Path and Power Proximity for Energy Efficient Key Distribution – 131

SEDIMENTARY ROCKS

The Origin of Dark Inclusions in Allende: New Evidence from Lithium Isotopes – 331

SEDIMENTS

Use of Stochastic Modeling of Stratigraphic Relationships in High Resolution Seismic Reflection Data for Prediction of the Distribution of Acoustic and Geotechnical Property Variability in Near Surface Sediments on the East China Sea Continental Margin – 127

SEGMENTS

Survivability: A Markov Process – 247

SELF ASSEMBLY

Self-Assembled Colloidal Crystals for Photonic Applications and Its Outlook – 293

Study of Self-Assembly Monolayers for Colloidal Processing of Ceramics and Textured, Super-Hydrophobic – 58

SEMANTICS

Antigone: Implementing Policy in Secure Group Communication – 69

Identifying Semantic Roles Using Combinatory Categorial Grammar – 206

Nonverbal Behavior Generator for Embodied Conversational Agents – 204

Question Answering Based on Semantic Structures – 301

Stressed and Unstressed Pronouns: Complementary Preferences – 226

Temporal Analysis of Social Networks Using Three-Way DEDICOM – 198

SEMICONDUCTOR DEVICES

Methods for Controlling Dopant Concentration and Activation in Semiconductor Structers – 93

Semiconductor Conductive Layers – 89

SEMICONDUCTORS (MATERIALS)

Competing for the Future: A Historical Review of NIST ATP Investments in Semiconductor and Micro/Nano-Electronics – 86

Improved Temperature Characteristics in Quantum Dot Lasers with Indirect-Bandgap Barriers – 97

Methods for Controlling Dopant Concentration and Activation in Semiconductor Structers – 93

Predictive Computations of Properties of Wide-Gap and Nano-Semiconductors – 100

Semiconductor 1.7 W Volume Bragg Laser with Divergence Close to a Diffraction Limit – 111

Semiconductor Conductive Layers – 89

Voltage-Controlled Tunable GaAs/AlGaAs Multistack Quantum Well Infrared Detector – 108

Wide-Bandgap Semiconductors – 85

SEMISPAN MODELS

Progress in Flaps Down Flight Reynolds Number Testing Techniques at the NTF – 12

SENSITIVITY ANALYSIS

Sensitivity in Risk Analyses with Uncertain Numbers – 191

Survey of Sampling-Based Methods for Uncertainty and Sensitivity Analysis – 242

SENSITIVITY

An Operator-Theoretic Approach to the Mixed-Sensitivity Minimization Problem – 236

High Sensitivity Array-Based Detection System – 94

SENSORS

A Set-Covering Approach for Modeling Attacks on Key Predistribution in Wireless Sensor Networks – 214

Carbon Nanotube Based Light Sensor – 78

Fiber Optic Raman Sensor to Monitor Concentration Ratio of Nitrogen and Oxygen in a Cryogenic Mixture – 286

Natural Fiber Spin Reflectometer Providing a Virtual Differential Signal Sensing Array Capability – 289

Sensor Networking Testbed with IEEE 1451 Compatibility and Network Performance Monitoring – 213

SENSORY FEEDBACK

Sensorimotor Interactions in the Haptic Perception of Virtual Objects – 182

SENSORY PERCEPTION

Human Haptic Interaction with Soft Objects: Discriminability, Force Control, and Contact Visualization – 182

Sensorimotor Interactions in the Haptic Perception of Virtual Objects – 182

SENSORY STIMULATION

Sensorimotor Interactions in the Haptic Perception of Virtual Objects – 182

SENTENCES

Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

UMass at TREC 2004: Novelty and HARD – 310

SEPARATED FLOW

High-Lift System for a Supercritical Airfoil: Simplified by Active Flow Control – 15

Statistical Analysis of CFD Solutions from the Third AIAA Drag Prediction Workshop – 243

SEPARATORS

Commissioning of the Digital LLRF for CEBAF Injector/Separator – 269

SEQUENCING

Characteristic Shape Sequences for Measures on Images – 252

People Recognition in Image Sequences by Supervised Learning – 286

Trains of Magnetic Holes and Magnetic Humps in the Heliosheath – 325

Video Summarization by Curve Simplification – 234

SET THEORY

Incremental Model-Based Clustering for Large Datasets With Small Clusters – 255

SEWERS

Unsteady Storm Drainage Modeling Within the U.S. Army Corps of Engineers GSSHA Model – 106

SHALLOW WATER

Chemical Character of Ground Water in the Shallow Water-Table Aquifer at Selected Localities in the Memphis Area, Tennessee – 38

SHAPE MEMORY ALLOYS

Functionally Graded Shape Memory Alloy Composites Optimized for Passive Vibration Control – 45

SHAPES

Characteristic Shape Sequences for Measures on Images – 252

Investigating Shape Representation in Area V4 with HMAX: Orientation and Grating Selectivities – 224

Lensing Signals in the Hubble Ultra-Deep Field Using All 2nd-Order Shape Deformations – 321

Multiscale Signal Processing and Shape Analysis for an Inverse Sar Imaging System – 109

Size Selection Initiation Model Extended to Include Shape and Random Factors – 197

Using 3-Dimensional Meshes to Combine Image-Based and Geometry Constraints – 228

SHEAR STRESS

Characterization and Modeling of Bonded Piezoelectric Sensor Performance and Durability in Simulated Aircraft Environments (Preprint) – 17

SHEAROGRAPHY

Laser Shearography Inspection of TPS (Thermal Protection System) Cork on RSRM (Reusable Solid Rocket Motors) – 116

SHERGOTTITES

Rb-Sr and Sm-Nd Isotopic Studies of Martian Depleted Shergottes SaU 094/005 – 327

SHIELDING

Supplemental Release Limits for the Directed Reuse of Steel in Road Barriers and Lead in Shielding Products by the Department of Energy – 318

SHIPYARDS

A Methodology for Improving the Shipyard Planning Process: Using KVA Analysis, Risk Simulation and Strategic Real Options – 100

SHOCK WAVE INTERACTION

Assessment of Turbulent Shock-Boundary Layer Interaction Computations Using the OVERFLOW Code – 101

Three-Dimensional Computational Model for Flow in an Over-Expanded Nozzle With Porous Surfaces – 1

SHOCK WAVES

Alfven Waves in the Solar Wind, Magnetosheath, and Outer Magnetosphere – 333

SHORELINES

Boussinesq Modeling of Alongshore Swash Zone Currents – 102

National Shoreline Erosion Control Demonstration Program Overview – 147

SHORT CIRCUITS

Method and System for Determining the Position of a Short Circuit in a Branched Wiring System – 92

SHOT PEENING

The Effects of Laser Peening and Shot Peening on Mechanical Properties in Friction Stir Welded 7075-T7351 Aluminum – 54

SHUTTLE DERIVED VEHICLES

A Review of Manned Thermal Garment Diving Studies With Lessons Learned for the SDV Operator and Combat Swimmer – 299

SICKNESSES

Heat Related Illnesses – 179

SIDELOBES

A Low-Sidelobe Partially Overlapped Constrained Feed Network for Time-Delayed Subarrays – 99

SIGNAL ANALYZERS

Design and Testing of Gproto bunch-by-bunch Signal Processor – 294

SIGNAL DETECTION

Intensity Analysis of Recurrence Plots for the Detection of Deterministic Signals in Noise – 247

SIGNAL DETECTORS

Natural Fiber Spin Reflectometer Providing a Virtual Differential Signal Sensing Array Capability – 289

SIGNAL PROCESSING

A Comparison of Power-Efficient Broadcast Routing Algorithms – 132

A Framework for Non-Gaussian Signal Modeling and Estimation – 187

Adaptive Bayesian Signal Reconstruction with A Priori Model Implementation and Synthetic Examples for X-Ray Crystallography – 242

Challenges to Control in Signal Processing and Communications – 84

Design and Testing of Gproto bunch-by-bunch Signal Processor – 294

Digital Nulling Pulse Inductive Metal Detector – 91

Efficient Implementations of 2-D Noncasual IIR Filters – 234

Low Complexity Signal Processing and Optimal Joint Detection for Over-Saturated Multiple Access Communications – 68

Magnetoelectric Multilayer Composites for Field Conversion – 91

Maximizing Static Network Lifetime of Wireless Broadcast Adhoc Networks – 131

Microphone-Independent Robust Signal Processing Using Probabilistic Optimum Filtering – 241

Multiscale Signal Processing and Shape Analysis for an Inverse Sar Imaging System – 109

On the Distributions of Optimized Multiscale Representations – 107

Signal Processing and Communication with Solitons – 69

Standardization of Object Oriented Extensions to Vector Signal and Image Processing Library (VSIPL) – 209

Step Current Inductive Antenna for Pulse Inductive Metal Detector – 91

Synthesis, Analysis, and Processing of Fractal Signals – 67

SIGNAL RECEPTION

VLF Signal Reception Capability of Three Experimental Crossed-Loop Antennas – 84

SIGNAL TO NOISE RATIOS

Enhancement of Stochastic Resonance Using Optimization Theory – 249

Simulation of Organic Magnetic Resonance Force Microscopy Experiments – 50

SIGNAL TRANSMISSION

A Wavelet Packet Approach to Transient Signal Classification – 284

SIGNATURES

Differential Invariant Signatures and Flows in Computer Vision: A Symmetry Group Approach – 221

SIGNS AND SYMPTOMS

Heat Related Illnesses – 179

Validation of a Shortened Electronic Version of the Environmental Symptoms Questionnaire – 160

SILICA GLASS

CALE EOS Form 2 Fits for High Pressure Fused Silica Hugoniot Data – 39

SILICON CARBIDES

Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

SILICON DIOXIDE

Biological Applications and Transmission Electron Microscopy Investigation of Mesoporous Silica Nanoparticles – 49

CALE EOS Form 2 Fits for High Pressure Fused Silica Hugoniot Data – 39

Enzyme-Encapsulated Silica Monolayers for Rapid Functionalization of a Gold Surface PREPRINT – 50

Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

Silica-Immobilized Enzyme Reactors; Application to Cholinesterase-Inhibition Studies – 155

SILICON NITRIDES

MEMS Microshutter for James Webb Space Telescope – 319

SILICON

Developing an Inflatable Solar Array – 31

Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

Miniature and Molecularly Specific Optical Screening Technologies for Breast Cancer – 161

Template-Growth of Highly Ordered Carbon Nanotube Arrays on Silicon POSTPRINT – 53

SIMPLIFICATION

HDF5-Fast Query: An API for Simplifying Access to Data Storage, Retrieval, Indexing and Querying – 302

Stimulus Simplification and Object Representation: A Modeling Study – 193

Video Summarization by Curve Simplification – 234

SIMULATED ANNEALING

Simulated Annealing Type Algorithms for Multivariate Optimization – 249

SIMULATION

A Ground Vehicle Simulation Design to Study Driver Display Concepts – 64

A Methodology for Improving the Shipyard Planning Process: Using KVA Analysis, Risk Simulation and Strategic Real Options – 100

A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Advanced Distributed Simulation and the Fog-of-Simulation: Lessons Learned from the Cockpit – 14

Arcjet Semi-Elliptic Nozzle Simulations and Validation in Support of TPS Testing – 101

Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity – 178

Fire Dynamics Simulation (Version 2): Technical Reference Guide – 103

Ground Mobility M&S Technology Development and Application – 318

How Does Collisionless Magnetic Reconnection Work in the Presence of a Guide Magnetic Field? – 94

Human Emotional State and its Relevance for Military VR Training – 202

Improving Human Interfaces in Military Simulation Applications – 210

Macromodeling CMOS Circuits for Timing Simulation – 94

Methods, Knowledge Support, and Experimental Tools for Modeling – 209

Micromechanics and Microstructure Evolution: Modeling, Simulation and Experiments. Conference Held in Madrid, Spain, 12-16 Sep 2005 – 297

Mixing Story and Simulation in Interactive Narrative – 203

Modeling, Analysis, Simulation, and Synthesis of Biomolecular Networks – 162

New Simulation Capabilities of Electron Clouds in Ion Beams with Large Tune Depression – 279

Reflective Tutoring for Immersive Simulation – 220

Rudimentary Force Feedback for Safe Guarded Teleoperation of Unmanned Vehicles: A Simulations and Training Approach – 223

Runtime and Pressurization Analyses of Propellant Tanks – 36

Simulation Activities Using Gateway and Tactical Digital Information Links – 73

Simulation and Optimisation of a 100MA DC Photo-Injector – 258

Simulation Meets Hollywood: Integrating Graphics, Sound, Story and Character for Immersive Simulation – 200

Simulation of Biomolecular Nanomechanical Systems – 160

Simulation of Organic Magnetic Resonance Force Microscopy Experiments – 50

Simulation Study on Performance of Control by Man and Machine in the Stage of Final Approaching for Rendezvous and Docking – 175

STRATA: Observer-based Measurement Agent Research Support – 64

User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 208

Using Pin as a Memory Reference Generator for Multiprocessor Simulation – 191

SIMULATORS

Distributive Interactive Simulation Network Interface for A-10 Simulator in Support of I/ITSEC '95 Conference Demonstrations – 205

Fire Dynamics Simulator (Version 3) User's Guide – 103

Human Factors Evaluation of the Aerial Gunner Scanner Simulator – 8

SITUATIONAL AWARENESS

Between Imprudent and Impossible, Survivability Implications of Threat Analysis or What Threats Should We Design Against – 335

Passive Panoramic Image Fusion (PPIF) for 360 Degree Situational Awareness to Support Operations in Urban Terrain – 124

Using Observer Ratings to Assess Situational Awareness in Tactical Air Environments – 6

SIZE (DIMENSIONS)

Uncertainty of the Characteristic of the Size-of-Source Effect in Radiation Thermometers – 82

SKY SURVEYS (ASTRONOMY)

The Swift/BAT Hard X-ray Survey – 321

SLEEP DEPRIVATION

PR01 - The Effects of Total Sleep Deprivation and Recovery Sleep on Cognitive Performance and Brain Function – 182

SLEEP

PR01 - The Effects of Total Sleep Deprivation and Recovery Sleep on Cognitive Performance and Brain Function – 182

SLEEVES

A Wide-Aperture HF Direction-Finder with Sleeve Antennas – 67

SLIDING FRICTION

Application of Carbon Based Nano-Materials to Aeronautics and Space Lubrication – 114

SLOTS

Fractional-Slot Surface Mounted PM Motors with Concentrated Windings for HEV Traction Drives – 85

SMOKE

User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 209

SOARING

Guidance and Control of an Autonomous Soaring UAV – 25

SOCIAL FACTORS

Evaluating Social Causality and Responsibility Models: An Initial Report – 222

Mitigation Theory: An Integrated Approach – 249

SOCIOLOGY

NL Generation for Virtual Humans in a Complex Social Environment – 207

SOFTWARE DEVELOPMENT TOOLS

Development of a Data Management Tool for Investigating Multivariate Space and Free Will Experiences in Virtual Reality – 201

Model-driven Architecture and Its Impact on the Software Development Process – 81

Software Tool for Analysis of Variance of DNA Microarray Data – 163

Specification for Visual Requirements of Work-Centered Software Systems – 211

SOFTWARE ENGINEERING

An Analysis of Earned Value Management Implementation Within the F-22 System Program Office's Software Development – 19

Analytical Design of Evolvable Software for High-Assurance Computing – 208

Collision Avoidance and Resolution Multiple Access (CARMA) – 213

Emotionally Evocative Environments for Training – 212

NASA CEV Reference GN&C Architecture – 21

Specification for Visual Requirements of Work-Centered Software Systems – 211

The Case for an Open Data Model – 201

SOFTWARE RELIABILITY

Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative – 311

SOHO MISSION

Lessons Learned From Seven Space Shuttle Missions – 33

SOLAR ACTIVITY

Direct Imaging of Stellar Surfaces: Results from the Stellar Imager (SI) Vision Mission Study – 325

SOLAR ARRAYS

Developing an Inflatable Solar Array – 31

Probabilistic Thermal Analysis During Mars Reconnaissance Orbiter Aerobraking – 105

SOLAR CELLS

Developing an Inflatable Solar Array – 31

Development of High Efficiency, Low-Cost Flexible Dye-Sensitized Solar Cells – 84

Device Performance – 83

Electro-Optical Characterization – 128

SOLAR COLLECTORS

Parabolic Trough VSHOT Optical Characterization in 2005-2006 – 129

Thermal Storage Commercial Plant Design Study for a 2-Tank Indirect Molten Salt System. Final Report for May 13, 2002 to December 31, 2004 – 127

Trough Receiver Heat Loss Testing – 129

SOLAR CORPUSCULAR RADIATION

Evaluating Shielding Effectiveness for Reducing Space Radiation Cancer Risks – 334

SOLAR CYCLES

Modeling the Observed Solar Cycle Variations of the Quasi-biennial Oscillation (QBO): Amplification by Wave Forcing – 144

SOLAR ENERGY CONVERSION

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 1: Preferred Plant Size. Report for January 20, 2005 to December 31, 2005 – 129

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 3: Multiple Plants at a Common Location. Report for January 20, 2005 to December 31, 2005 – 128

SOLAR ENERGY

Accelerating PV Cost Effectiveness Through Systems Design, Engineering, and Quality Assurance. Phase 1 Annual Technical Report, November 4, 2004-November 3, 2005 – 130

Model Calculations of Solar Spectral Irradiance in the 3.7 Micron Band for Earth Remote Sensing Applications – 141

Powered by the Sun, 2007 Solar Decatholon – 130

SOLAR POWER SATELLITES

Re-Evaluating Satellite Solar Power Systems for Earth – 130

SOLAR PROTONS

Mesospheric Dynamical Changes Induced by the Solar Proton Events in October-November 2003 – 145

SOLAR STORMS

Mesospheric Dynamical Changes Induced by the Solar Proton Events in October-November 2003 – 145

SOLAR WIND

Alfven Waves in the Solar Wind, Magnetosheath, and Outer Magnetosphere – 333

Genesis Silicon Carbide Concentrator Target 60003 Preliminary Ellipsometry Mapping Results – 329

SOLDERED JOINTS

Projected Life of the SLAC Linac Braze Joints: Braze Integrity and Corrosion of Cooling Water Hardware on Accelerator Sections – 279

SOLENOIDS

High Field Solenoid Magnets for Muon Cooling – 261

SOLID LUBRICANTS

Post Irradiation Evaluation of Thermal Control Coatings and Solid Lubricants to Support Fission Surface Power Systems – 115

SOLID OXIDE FUEL CELLS

Solid Oxide Fuel Cell APU Feasibility Study for a Long Range Commercial Aircraft Using UTC ITAPS Approach – 23

SOLID PROPELLANT ROCKET ENGINES

NASA/MSFC's Calculation for Test Case 1a of ATAC-FSDC Workshop on After-body and Nozzle Flows – 102

SOLID SOLUTIONS

Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint) – 62

SOLID STATE

Nanoscale Devices for Solid State Refrigeration and Power Generation – 133

Solid-State and Vacuum Thermionic Energy Conversion – 134

Trends and Opportunities in Photonics Technologies: Solid-State Lighting and Healthcare – 87

SOLIDS

Numerical Methods for Analysis of Charged Vacancy Diffusion in Dielectric Solids – 96

SOLITARY WAVES

Nonhydrostatic Numerical Investigations of Oscillating Flow over Sills: Generation of Internal Tides and Solitary Waves – 234

Signal Processing and Communication with Solitons – 69

SOLVENTS

Ionic Solvents Used in Ionic Polymer Transducers, Sensors and Actuators – 41

SOOT

Graphene Layer Growth: Collision of Migrating Five-Member Rings – 52

SOUND TRANSDUCERS

Performance, Thermal, and Vibration Qualification Testing of Zetec Acoustic Transducers, Model Z0002659-2, Sondicator Probes – 282

SOUND WAVES

A Wavelet Packet Approach to Transient Signal Classification – 284

Characterization of Materials with Optically Shaped Acoustic Waveforms – 272

Chemical Agent Detector – 139

Scattering of Evanescent Acoustic Waves by Regular and Irregular Objects – 282

SPACE CHARGE

Direct Space Charge Effects on the ILC Damping Rings: Task Force Report – 281

Space Charge and Equilibrium Emittances in Damping Rings – 273

SPACE DEBRIS

Mission Success and Environmental Protection: Orbital Debris Considerations – 317

STS-114 Micrometeoroid/Orbital Debris (MMOD) Post-Flight Assessment – 330

SPACE EXPLORATION

Active Thermal Control System Development for Exploration – 328

Exploration Life Support Technology Development Challenges – 327

SPACE FLIGHT

Conference Support - Surgery in Extreme Environments - Center for Surgical Innovation – 29

Into the Unknown Together. The DOD, NASA, and Early Spaceflight – 31

SPACE LAW

Mission Success and Environmental Protection: Orbital Debris Considerations – 317

SPACE MISSIONS

Digital Learning Network Education Events of NASA's Extreme Environments Mission Operations – 331

Exploration Life Support Technology Development Challenges – 327

Issues and Implications of the Thermal Control System on Responsive Space Missions – 29

NASA CEV On-Orbit GN&C Analysis – 35

NASA CEV Reference GN&C Architecture – 21

Origin and Evolution of Deep Plasmaspheric Notches – 326

SPACE POWER REACTORS

High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems – 57

SPACE SHUTTLE MISSIONS
Lessons Learned From Seven Space Shuttle Missions – 33

STS-114 Micrometeoroid/Orbital Debris (MMOD) Post-Flight Assessment – 330

SPACE SHUTTLES
Orbiter Gap Filler Bending Model for Reentry – 33

SPACE TECHNOLOGY EXPERIMENTS
Control of the ST7 Disturbance Reduction System Flight Experiment – 34

SPACE TRANSPORTATION SYSTEM FLIGHTS
Constellation Stretch Goals: Review of Industry Inputs – 250

Lessons Learned From Seven Space Shuttle Missions – 33

SPACEBORNE TELESCOPES
MEMS Microshutter for James Webb Space Telescope – 319

SPACECRAFT CABINS
Study on Operational Reliability of Astronaut in Spacecraft Cabin – 178

SPACECRAFT CONSTRUCTION MATERIALS
Pressure Effects on Oxygen Concentration Flammability Thresholds of Materials for Aerospace Applications – 35

SPACECRAFT CONTROL
NASA CEV On-Orbit GN&C Analysis – 35

NASA CEV Reference Entry GN&C System and Analysis – 21

NASA CEV Reference GN&C Architecture – 21

SPACECRAFT DESIGN
Concept for Lightweight Spaced-Based Deposition Technology – 28

SPACECRAFT DOCKING
Simulation Study on Performance of Control by Man and Machine in the Stage of Final Approaching for Rendezvous and Docking – 175

SPACECRAFT GUIDANCE
NASA CEV On-Orbit GN&C Analysis – 35

NASA CEV Reference GN&C Architecture – 21

SPACECRAFT LAUNCHING
Environmental Support to Space Launch – 30

Mission Success and Environmental Protection: Orbital Debris Considerations – 317

SPACECRAFT ORBITS
NASA CEV On-Orbit GN&C Analysis – 35

SPACECRAFT POWER SUPPLIES
Re-Evaluating Satellite Solar Power Systems for Earth – 130

SPACECRAFT REENTRY
Orbiter Gap Filler Bending Model for Reentry – 33

SPACERS
Use of a Spacer Vest to Increase Evaporative Cooling Under Military Body Armor – 297

SPACE-TIME FUNCTIONS
A Distributed and Iterative Method for Square Root Filtering in Space-Time Estimation – 191

SPAIN
Micromechanics and Microstructure Evolution: Modeling, Simulation and Experiments. Conference Held in Madrid, Spain, 12-16 Sep 2005 – 297

SPALLATION
SNS Cryogenic Systems Commissioning – 295

SPARK IGNITION
Spark Ignition Aircraft Engine Endurance Test of Aviation-Grade Ethanol 85 – 37

SPATIAL DISTRIBUTION
Analysis of fMRI Data by Blind Separation into Independent Spatial Components – 169

SPATIAL RESOLUTION
Initial Demonstration of Mercury Wavefront Correction System – 287

SPECIFICATIONS
Specification for Visual Requirements of Work-Centered Software Systems – 211

SPECTRAL BANDS
Zeeman Tuning Rates in the v3 Band of NO2 – 111

SPECTRA
New Hyperspectral Discrimination Measure for Spectral Characterization – 229

Target Detection in Multispectral Images using the Spectral Co-Occurrence Matrix and Entropy Thresholding – 284

X-Ray Spectral Study of the Photoionized Stellar Wind in Vela X-1 – 324

SPECTROSCOPY
Jefferson Lab Phenomenology: Selected Highlights – 277

Laser-Based Spectroscopic Detection Techniques – 288

Near-Infrared Fuel Analysis – 63

Optical Spectroscopy and Multiphoton Imaging for the Diagnosis and Characterization of Hyperplasias in the Mouse Mammary – 172

SPECTRUM ANALYSIS
Modeling the Observed Solar Cycle Variations of the Quasi-biennial Oscillation (QBO): Amplification by Wave Forcing – 144

New Hyperspectral Discrimination Measure for Spectral Characterization – 228

X-Ray Spectral Study of the Photoionized Stellar Wind in Vela X-1 – 324

SPEECH RECOGNITION
Acoustic Measurements for Speaker Recognition – 282

Adaptation to New Microphones Using Tied-Mixture Normalization – 71

Automated Story Capture From Conversational Speech – 301

Byblos Speech Recognition Benchmark Results – 226

Continuous Speech Recognition Using Segmental Neural Nets – 74

Experiments in Speech Understanding System Control – 67

Fast Search Algorithms for Connected Phone Recognition Using the Stochastic Segment Model – 235

Improving State-of-the-Art Continuous Speech Recognition System Using the N-Best Paradigm with Neural Networks – 74

Is N-Best Dead? – 241

Microphone-Independent Robust Signal Processing Using Probabilistic Optimum Filtering – 241

Perceptual Evaluation of Video-Realistic Speech – 71

SPEECH
Experiments in Evaluating Interactive Spoken Language Systems – 316

Exploring Speech-Enabled Dialogue with the Galaxy Communicator Infrastructure – 217

Microphone-Independent Robust Signal Processing Using Probabilistic Optimum Filtering – 241

Speech Synthesis by Rule: An Acoustic Domain Approach – 220

SPENT FUELS
Fuel-Cladding Interaction Layers in Irradiated U-Zr and U-Pu Zr Fuel Elements – 40

Toxicological Evaluation of Depleted Uranium in Rats: Six-Month Evaluation Point – 168

SPINEL
The Effect of Hot Isostatic Pressing on the Optical Properties Of Spinel – 62

SPINE
Effects of Head Mounted Devices on Head-Neck Dynamic Response to +GZ Accelerations – 181

Loads Induced in the Lumbar Spine of Seated Restrained Humans by Sideward (+Gy) Impact – 181

SPLASHING
Boussinesq Modeling of Alongshore Swash Zone Currents – 102

SPRAYERS
Reactive Materials and Thermal Spray Methods of Making Same – 56

SPREAD SPECTRUM TRANSMISSION
- Spread Spectrum Modulation and Signal Masking Using Synchronized Chaotic Systems – 69

SPREADSHEETS
- Algorithms using Java for Spreadsheet Dependent Cell Recomputation – 240
- NoPumpG: Creating Interactive Graphics With Spreadsheet Machinery – 209

SPUTTERING
- Reply to Comment by M. Bodeau on 'Charging of Mirror Surfaces in Space' – 32

STABILITY TESTS
- Output Stabilizability of Discrete Event Dynamic Systems – 194

STABILITY
- Bagging Regularizes – 246
- DNA Precursor Metabolism and Mitochondrial Genome Stability – 173
- Output Stabilizability of Discrete Event Dynamic Systems – 235
- Statistical Learning: Stability is Sufficient for Generalization and Necessary and Sufficient for Consistency of Empirical Risk Minimization – 256
- Study of Stability Conditions in an Urban Area – 139
- Tailored Excitation for Frequency Response Measurement Applied to the X-43A Flight Vehicle – 25

STABILIZATION
- Designing a Self-Stabilizing Robot for Dynamic Mobile Manipulation – 225
- Easy Estimation of Normalizing Constants and Bayes Factors from Posterior Simulation: Stabilizing the Harmonic Mean Estimator – 246
- Output Stabilizability of Discrete Event Dynamic Systems – 194

STAINLESS STEELS
- Novel Chamber Design for an In-Vacuum Cryo-Cooled Mini-Gap Undulator – 274

STANDARDIZATION
- Standardization of Object Oriented Extensions to Vector Signal and Image Processing Library (VSIPL) – 209
- Standardized UXO Technology Demonstration Site Open Field Scoring Record No. 802 – 336

STATIC LOADS
- Phase Transformation of 'Chem-prep' PZT 95/5-2Nb HF 1035 Ceramic Under Quasi-static Loading Conditions – 61

STATISTICAL ANALYSIS
- A Critical Analysis of the Acquisition Review Journal: Are We in Step with the Field? – 314
- Calibrated Probabilistic Forecasting Using Ensemble Model Output Statistics and Minimum CRPS Estimation – 241
- Can One Decide the Type of the Mean from the Empirical Measure? – 243
- Cross-Lingual Lexical Triggers in Statistical Language Modeling – 244
- Large Deviations and Applications: The Finite Dimensional Case – 189
- Multiresolution Optimal Interpolation and Statistical Analysis of Topex/Poseidon Satellite Altimetry – 238
- Multi-Scale Autoregressive Processes – 242
- Statistical Alignment Models in Machine Translation from Slovenian to English – 186
- Statistical Analysis of CFD Solutions from the Third AIAA Drag Prediction Workshop – 243
- Statistical Methods and Software for the Analysis of Occupational Exposure Data with Non-Detectable Values – 242
- Techniques for the Statistical Analysis of Observer Data – 248

STATISTICAL DECISION THEORY
- Can One Decide the Type of the Mean from the Empirical Measure? – 243

STATISTICAL DISTRIBUTIONS
- Five Millennium Canon of Solar Eclipses: -1999 to +3000 (2000 BCE to 3000 CE) – 320

STATISTICAL TESTS
- Statistical Comparisons of Classifiers in Machine Learning – 79

STATORS
- Modulation in Stator Flux Control of Induction Motor for Reduced Torque Ripple – 77

STEELS
- Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Contemporaneous Structural Steel Specifications. NIST NCSTAR 1-3A – 120
- Fracture Toughness and Strength in a New Class of Bainitic Chromium-Tungsten Steels – 46
- In-Situ Observation of Phase Transformations During Welding of 1045 Steel Using Spatially Resolved and Time Resolved X-Ray Diffraction – 56
- Supplemental Release Limits for the Directed Reuse of Steel in Road Barriers and Lead in Shielding Products by the Department of Energy – 318

STELLAR ATMOSPHERES
- Future Gamma-Ray Observations of Pulsars and their Environments – 321

STELLAR EVOLUTION
- Evolution of Intermediate and Low Mass Binary Systems – 333

STELLAR INTERIORS
- Direct Imaging of Stellar Surfaces: Results from the Stellar Imager (SI) Vision Mission Study – 325

STELLAR WINDS
- X-Ray Spectral Study of the Photoionized Stellar Wind in Vela X-1 – 324

STEM CELLS
- Bucky Paper as a Support Membrane in Retinal Cell Transplantation – 149

STIMULI
- Stimulus Simplification and Object Representation: A Modeling Study – 193

STIRLING CYCLE
- Heat Transfer and Fluid Dynamics Measurements in the Expansion Space of a Stirling Cycle Engine – 37

STIRLING ENGINES
- Heat Transfer and Fluid Dynamics Measurements in the Expansion Space of a Stirling Cycle Engine – 37

STOCHASTIC PROCESSES
- A Canonical Correlations Approach to Multiscale Stochastic Realization – 193
- A Class of Adaptive Control Problems Solved via Stochastic Control – 207
- Enhancement of Stochastic Resonance by Tuning System Parameters and Adding Noise Simultaneously – 248
- Enhancement of Stochastic Resonance Using Optimization Theory – 249
- Estimating Grammar Parameters using Bounded Memory – 239
- Fast Search Algorithms for Connected Phone Recognition Using the Stochastic Segment Model – 235
- Fractal Estimation using Models on Multiscale Trees – 238
- Lattice Approximation in the Stochastic Quantization of (04)2 Fields – 237
- Markov Random Fields, Stochastic Quantization and Image Analysis – 243
- New Hyperspectral Discrimination Measure for Spectral Characterization – 228
- PAC Learning with Generalized Samples and an Application to Stochastic Geometry – 187
- Rollout Algorithms for Stochastic Scheduling Problems – 234
- Simulated Annealing Type Algorithms for Multivariate Optimization – 248
- Speed and Accuracy in Shallow and Deep Stochastic Parsing – 241
- Stereo Matching by Hierarchical, Microcanonical Annealing – 249
- Toward a Theory of Nonlinear Stochastic Realization – 230
- Two Algorithms for Learning the Parameters of Stochastic Context-Free Grammars – 239
- Use of Stochastic Modeling of Stratigraphic Relationships in High Resolution Seismic Reflection Data for Prediction of the Distribution of Acoustic and Geotechnical Property Variability in Near Surface Sediments on the East China Sea Continental Margin – 127

STORAGE RINGS (PARTICLE ACCELERATORS)

Characterization of the Pep-II Colliding-Beam Phase Space by the Boost Method – 264

Ion Effects in the Electron Damping Ring of the International Linear Collider – 295

Measurement of Decay Amplitudes of B to ccbar K asterik with an Angular Analysis, for ccbar=J/Psi, Psi2S and chic 1. The BABAR Collaboration – 267

Summary of Beam Cooling and Intrabeam Scattering – 261

STORAGE TANKS

New High Capacity Getter for Vacuum Insulated Mobile Liquid Hydrogen Storage Systems – 105

STORMS

Unsteady Storm Drainage Modeling Within the U.S. Army Corps of Engineers GSSHA Model – 106

STRAIN ENERGY RELEASE RATE

Effect of Strain-Path Reversal on Microstructure Evolution and Cavitation During Hot Torsion Testing of Ti-6A1-4V (Preprint) – 56

STRAIN RATE

High Tensile Strength Carbon Nanotube Film and Process for Making the Same – 293

STRAKES

Aerodynamic Analysis of Body-Strake Configurations – 5

STRANGENESS

Baryon-Strangness Correlations: A Diagnostic of Strongly Interacting Matter – 273

STRATA

STRATA: Observer-based Measurement Agent Research Support – 65

STRATIGRAPHY

Use of Stochastic Modeling of Stratigraphic Relationships in High Resolution Seismic Reflection Data for Prediction of the Distribution of Acoustic and Geotechnical Property Variability in Near Surface Sediments on the East China Sea Continental Margin – 127

STREAMS

Drainage Areas of Streams at Selected Locations in Kentucky – 124

Drainage-Area Data for Wisconsin Streams – 123

STREETS

Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

STRESS (BIOLOGY)

Bone Geometry as a Predictor of Tissue Fragility and Stress Fracture Risk – 151

STRESS INTENSITY FACTORS

Crack Growth and Stress Intensity Prediction Techniques. Delivery Order 0027-1: Mixed Mode Failure Criteria – 281

STRINGS

Training Tree Transducers – 230

STRONTIUM ISOTOPES

Rb-Sr and Sm-Nd Isotopic Studies of Martian Depleted Shergottes SaU 094/005 – 327

STRONTIUM TITANATES

Radio Frequency Applications of Barium Strontium Titanate Thin Film Tunable Capacitors – 97

STRONTIUM

Sm-Nd and Rb-Sr Ages for MIL 05035: Implications for Surface and Mantle Sources – 331

STRUCTURAL ANALYSIS

Simulation of Delamination Propagation in Composites Under High-Cycle Fatigue by Means of Cohesive-Zone Models – 122

STRUCTURAL DESIGN

Probabilistic Design of Composite Structures – 45

SUBMARINES

Passive Badge Assessment for Long-Term, Low-Level Air Monitoring on Submarines: VOC Badge Validation – 44

SUBSONIC SPEED

Statistical Analysis of CFD Solutions from the Third AIAA Drag Prediction Workshop – 244

SUBSTITUTES

Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint) – 62

SUBSTRATES

Aluminum Nitride Substrate Growth by Halide Vapor Transport Epitaxy – 53

An Integrated Tool for High Speed Circuit Design Including Substrate Effects – 98

Carbon Nanotube Based Light Sensor – 78

SULFATES

Thermodynamics of Neptunium(V) Fluoride and Sulfate at Elevated Temperatures – 51

SUMMARIES

Model Selection in Summary Evaluation – 305

SUN

Five Millennium Canon of Solar Eclipses: -1999 to +3000 (2000 BCE to 3000 CE) – 320

Powered by the Sun, 2007 Solar Decatholon – 130

SUPERCONDUCTING CAVITY RESONATORS

High Precision SC Cavity Diagnostics with Hom Measurements – 266

SUPERCONDUCTING FILMS

Enhanced Pinning in YBCO Films with Bazro3 Nanoparticles – 294

SUPERCONDUCTORS (MATERIALS)

Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint) – 62

Magnetization Losses in Multifilament Coated Superconductors (Postprint) – 280

SUPERCRITICAL AIRFOILS

High-Lift System for a Supercritical Airfoil: Simplified by Active Flow Control – 15

SUPERLATTICES

The Effect of Temperature on the Resonant Tunneling and Electric Field Domain Formation in Multiple Quantum Well Superlattices – 296

SUPERNOVAE

Inverse Compton Emission from Galactic Supernova Remnants: Effect of the Interstellar Radiation Field – 322

SUPERSONIC BOUNDARY LAYERS

Optimal Control of Shock Wave Turbulent Boundary Layer Interactions Using Micro-Array Actuation – 2

SUPERSONIC COMBUSTION

Development of Supersonic Combustion Experiments for CFD Modeling – 106

SUPERSONIC JET FLOW

Development of Supersonic Combustion Experiments for CFD Modeling – 106

SUPERSONIC SPEED

Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel – 26

SUPPLYING

Soldier System Power Sources – 131

SUPPORT SYSTEMS

The Development of a Business Case Analysis for the Acquisition of the Agile Rapid Global Combat Support System Used for the USA Marine Corps' Ground Equipment – 66

SUPPRESSORS

Effect of Chimaerins, Novel Receptors for Phorbol Esters, on Breast Cancer Cell Proliferation and Cell Cycle Progression – 165

Identification of the Downstream Promoter Targets of Smad Tumor Suppressors in Human Breast Cancer Cells – 160

Measured Effects of a Narrowband Interference Suppressor on GPS Receivers – 99

SURFACE PROPERTIES

Decontamination of Genesis Array Materials by UV Ozone Cleaning – 329

Investigating the Interface of Superhydrophobic Surfaces in Contact With Water – 47

Surface Analysis – 128

SURFACE ROUGHNESS

17Beta-Estradiol Modulates the Response of Human Osteoblasts to Titanium Surface Roughness – 58

Discrete Roughness Transition for Hypersonic Flight Vehicles – 3

SURFACE VEHICLES

A Lesson from the Past for Safer Future Tactical Vehicles – 317

CARAVAN: Providing Location Privacy for VANET – 68

Present and Future Diagnostics and Prognostics of Ground Combat Vehicles – 318

SURFACE WATER

Unsteady Storm Drainage Modeling Within the U.S. Army Corps of Engineers GSSHA Model – 106

SURFACE WAVES

Chemical Agent Detector – 139

Seismic Measurement of Concrete Strength Properties – 27

SURGERY

Conference Support - Surgery in Extreme Environments - Center for Surgical Innovation – 29

Development of a Portable Simulator for Training Robot Assisted Surgery – 220

SURVEILLANCE

Epidemic Outbreak Surveillance (EOS) – 168

Increasing Breast Cancer Surveillance Among African American Breast Cancer Survivors – 150

Preserving Privacy by De-identifying Facial Images – 73

SURVEYS

Evolution of the U.S. Housing Finance System: A Historical Survey and Lessons for Emerging Mortgage Markets – 305

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Technical Documentation for Survey Administration. Questionnaires, Interviews, and Focus Groups. NIST NCSTAR 1-7B – 119

National Register Assessment of the Broadmoor Neighborhood, New Orleans, Orleans Parish, Louisiana – 122

Phase I Cultural Resources Survey and Archeological Inventory of a Proposed 1.12 ha (2.87 ac) Borrow Pit and an Associated Access Road, Ascension Parish, Louisiana – 126

Survey of Codes and Algorithms Used in NERSC Material Science Allocations – 188

Survey of Sampling-Based Methods for Uncertainty and Sensitivity Analysis – 242

Survey of the Hypervelocity Impact Technology and Applications – 28

SURVIVAL

Energy Absorber for Vehicle Occupant Safety and Survivability – 184

Joint Survivability Experiment with Navair – 184

SUSQUEHANNA RIVER BASIN (MD-NY-PA)

Risk-Based Decision Support of Water Resource Management Alternatives – 251

SWEAT

Transient Sweat Rate Calculation from Humidity Measurements Under Clothing – 298

SWEPT WINGS

Review of Cranked-Arrow Wing Aerodynamics Project: Its International Aeronautical Community Role – 13

USM3D Unstructured Grid Solutions for CAWAPI at NASA LaRC – 13

SWIFT OBSERVATORY

The Swift/BAT Hard X-ray Survey – 321

SWITCHES

Elastomer Impact When Switch-Loading Synthetic Fuel Blends and Petroleum Fuels – 63

SWITCHING CIRCUITS

All-Optical Controllable Photonic Switch – 290

SWITCHING THEORY

Analysis of Continuous Switching Systems: Theory and Examples – 254

SWITCHING

Analysis of Continuous Switching Systems: Theory and Examples – 254

Calibrated Probabilistic Forecasting at the Stateline Wind Energy Center: The Regime-Switching Space-Time (RST) Method – 147

SYMBOLS

Dealing with Out of Domain Questions in Virtual Characters – 219

SYMMETRY

Differential Invariant Signatures and Flows in Computer Vision: A Symmetry Group Approach – 221

On the Relation of Anticipative Stratonovich and Symmetric Integrals: A Decomposition Formula – 189

SYNCHRONISM

Some Issues in Distributed Asynchronous Routing in Virtual Circuit Data Networks – 190

Spread Spectrum Modulation and Signal Masking Using Synchronized Chaotic Systems – 69

Using Pin as a Memory Reference Generator for Multiprocessor Simulation – 191

SYNCHROTRON RADIATION

Bunch Length Measurements at the JLab FEL Using Coherent Transition and Synchrotron Radiation – 295

SLS Optics Beamline – 265

SYNTAX

Nonverbal Behavior Generator for Embodied Conversational Agents – 204

SYNTHESIS

Synthesis of Multifunctional Materials – 335

SYNTHETIC APERTURE RADAR

Multiscale Signal Processing and Shape Analysis for an Inverse Sar Imaging System – 109

SYNTHETIC FUELS

Elastomer Impact When Switch-Loading Synthetic Fuel Blends and Petroleum Fuels – 63

SYSTEM EFFECTIVENESS

Evaluation of the Modular Semi-Automated Force Air Entity Simulation – 11

Experiments in Evaluating Interactive Spoken Language Systems – 315

Intelligent Mobility Laboratory – 66

SYSTEMS ANALYSIS

Analysis, Estimation, and Control for Perturbed and Singular Systems and for Systems Subject to Discrete Events – 250

Estimation and Detection with Chaotic Systems – 243

NASA CEV Reference Entry GN&C System and Analysis – 21

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 1: Preferred Plant Size. Report for January 20, 2005 to December 31, 2005 – 129

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 2: Comparison of Wet and Dry Rankine Cycle Heat Rejection. Report for January 20, 2005 to December 31, 2005 – 128

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 3: Multiple Plants at a Common Location. Report for January 20, 2005 to December 31, 2005 – 128

SYSTEMS ENGINEERING

A Model-Driven Architecture Approach for Modeling, Specifying and Deploying Policies in Autonomous and Autonomic Systems – 225

A Simplified Approach for the Rapid Generation of Transient Heat-Shield Environments – 34

Accelerating PV Cost Effectiveness Through Systems Design, Engineering, and Quality Assurance. Phase 1 Annual Technical Report, November 4, 2004-November 3, 2005 – 129

An Analysis of Earned Value Management Implementation Within the F-22 System Program Office's Software Development – 19

Control of the ST7 Disturbance Reduction System Flight Experiment – 34

Development of the System for Determination of the Size-of-Source Effect – 75

Intelligent Mobility Laboratory – 66

Intelligent Weather Agent – 112

Modeling and Analysis of Facility Systems for A Hybrid Materials Test Program – 62

Navigation Systems – 67

Realization Theory for Deterministic Boundary-Value Descriptor Systems – 186

The Rate of Progress in Natural Language Processing – 316

Turbomachinery Clearance Control – 115

Using Human Systems Integration and Knowledge Engineering to Define and Design Anti-Terrorism/Force Protection Systems and Solutions – 183

Using Motion-Base Simulation to Guide Future Force Systems Design – 113

SYSTEMS INTEGRATION

A Methodology for Improving the Shipyard Planning Process: Using KVA Analysis, Risk Simulation and Strategic Real Options – 100

Postsecondary Institutions in the USA: Fall 2005 and Degrees and Other Awards Conferred: 2004-05. First Look – 304

Using Human Systems Integration and Knowledge Engineering to Define and Design Anti-Terrorism/Force Protection Systems and Solutions – 183

TACTICS

A Lesson from the Past for Safer Future Tactical Vehicles – 317

Two Chapters of Technical Report: Unmanned Military Vehicles - Human Factors of Augmenting the Force Chapter 1: Introduction Chapter 8: Summary: Issues and Conclusions – 185

TANKER AIRCRAFT

Tanker-Force Structure: Recapitalization of the KC-135 – 15

TARGET ACQUISITION

Target Detection in Multispectral Images using the Spectral Co-Occurrence Matrix and Entropy Thresholding – 285

TARGET RECOGNITION

Digital Nulling Pulse Inductive Metal Detector – 91

Step Current Inductive Antenna for Pulse Inductive Metal Detector – 91

TARGET THICKNESS

Analysis Procedures for Double-Shell Target Concentricity and Wall Thickness – 271

TARGETS

Estrogen-Induced Depurination of DNA: A Novel Target for Breast Cancer Prevention – 173

Identification of the Downstream Promoter Targets of Smad Tumor Suppressors in Human Breast Cancer Cells – 160

Joint Fire Support in 2020: Development of a Future Joint Fires Systems Architecture for Immediate, Unplanned Targets – 214

Spin Structure Functions: Proton/Deuteron Measurements in the Resonance Region – 276

Target/Background Polarization Profiles Using a COTS Digital Camera – 108

TASKS

Development of a Navy Job-Specific Vocational Interest Model – 335

TAXONOMY

A Unified Taxonomic Approach to the Laboratory Assessment of Visionic Devices – 184

Risk-Based Decision Support of Water Resource Management Alternatives – 250

TEAMS

Two Chapters of Technical Report: Unmanned Military Vehicles - Human Factors of Augmenting the Force Chapter 1: Introduction Chapter 8: Summary: Issues and Conclusions – 185

TECHNOLOGY ASSESSMENT

Application of NASA's Advanced Life Support Technologies in Polar Regions – 148

CCD and PIN-CMOS Developments for Large Optical Telescope – 332

Privacy Technology Focus Group: Executive Summary – 194

Privacy Technology Focus Group: Final Report and Recommendations – 194

TECHNOLOGY UTILIZATION

Competing for the Future: A Historical Review of NIST ATP Investments in Semiconductor and Micro/Nano-Electronics – 86

Development of Controlled Ecological Life-support System in Russia – 176

Exploration Life Support Technology Development Challenges – 327

Ground Mobility M&S Technology Development and Application – 318

High Altitude Long Endurance Air Vehicle Analysis of Alternatives and Technology Requirements Development – 14

Materials Development for Hypersonic Flight Vehicles – 45

New Technologies for New and Existing Buildings Allowing for Energy Conservation – 127

Robotic Follower Experimentation Results – 221

Robotic Technologies for the Future Force - The ART STO – 223

Scientific Data Management Center – 190

Sensor to User - NASA/EOS Data for Coastal Zone Management Applications Developed from Integrated Analyses: Verification, Validation and Benchmark Report – 125

Survey of the Hypervelocity Impact Technology and Applications – 28

Trends and Opportunities in Photonics Technologies: Solid-State Lighting and Healthcare – 87

TELECOMMUNICATION

Challenges to Control in Signal Processing and Communications – 84

Communications System Based on Real-Time Neurophysiological Characterization – 70

EM Threat Analysis for Wireless Systems – 71

Extensions of Proportional-Fair Sharing Algorithms for Multi-Access Control of Mobile Communications: Constraints, Finite Queues and Bursty Data Processes – 72

Hardware-in-the-Loop Testing of Wireless Systems in Realistic Environments – 70

Low Complexity Signal Processing and Optimal Joint Detection for Over-Saturated Multiple Access Communications – 68

Performance Analysis of Adaptive Transmission Aided by Long Range Channel Prediction for Realistic Single- and Multi-Carrier Mobile Radio Channels – 71

Workshop for Open Source Universal Picture Archiving and Communication Systems (PACS) – 110

TELEOPERATORS

Rudimentary Force Feedback for Safe Guarded Teleoperation of Unmanned Vehicles: A Simulations and Training Approach – 223

TELEPHONES

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Technical Documentation for Survey Administration. Questionnaires, Interviews, and Focus Groups. NIST NCSTAR 1-7B – 119

TELESCOPES

CCD and PIN-CMOS Developments for Large Optical Telescope – 332

Lensing Signals in the Hubble Ultra-Deep Field Using All 2nd-Order Shape Deformations – 321

Telescopic Imaging of Heater-Induced Airglow at HAARP – 326

The Swift/BAT Hard X-ray Survey – 321

TEMPERATURE CONTROL

Active Thermal Control System Development for Exploration – 328

Issues and Implications of the Thermal Control System on Responsive Space Missions – 29

TEMPERATURE DEPENDENCE

Verification Test Problems for the Calculation of Probability of Loss of Assured Safety in Temperature-Dependent Systems with Multiple Weak and Strong Links – 190

TEMPERATURE DISTRIBUTION

The Effect of Temperature on the Resonant Tunneling and Electric Field Domain Formation in Multiple Quantum Well Superlattices – 296

TEMPERATURE EFFECTS

Autonomous Aerobraking Using Thermal Response Surface Analysis – 34

Effect of Solution Annealing on Alloy 22 Weld Properties – 54

The Effect of Temperature on the Resonant Tunneling and Electric Field Domain Formation in Multiple Quantum Well Superlattices – 296

TEMPERATURE MEASUREMENT

Uncertainty of the Characteristic of the Size-of-Source Effect in Radiation Thermometers – 82

TEMPLATES

Spatial Position Control of CdS Nanoclusters using a Self-Assembled Diblock Copolymer Template – 62

Summarization-Inspired Temporal-Relation Extraction: Tense-Pair Templates and Treebank-3 Analysis – 253

Tasks, Domains, and Languages – 308

Template-Growth of Highly Ordered Carbon Nanotube Arrays on Silicon POSTPRINT – 53

TENNESSEE

Construction, Geologic, and Water-Level Data for Observation Wells Near Brentwood, Williamson County, Tennessee – 124

TENSILE STRENGTH

High Tensile Strength Carbon Nanotube Film and Process for Making the Same – 293

TERRA SPACECRAFT

Global, Multi-Year Analysis of Clouds and Earth's Radiant Energy System Terra Observations and Radiative Transfer Calculations – 142

TERRAIN

Assessment of Historic Landscape, Highway 45 Borrow Pit, Jefferson Parish, Louisiana – 124

Passive Panoramic Image Fusion (PPIF) for 360 Degree Situational Awareness to Support Operations in Urban Terrain – 124

TERRESTRIAL RADIATION

Radiation and Plasma Environments for Lunar Missions – 333

TERRORISM

Using Human Systems Integration and Knowledge Engineering to Define and Design Anti-Terrorism/Force Protection Systems and Solutions – 183

TEST EQUIPMENT

Passive Badge Assessment for Long-Term, Low-Level Air Monitoring on Submarines: VOC Badge Validation – 44

The Development of a Business Case Analysis for the Acquisition of the Agile Rapid Global Combat Support System Used for the USA Marine Corps' Ground Equipment – 66

TEST FACILITIES

Modeling and Analysis of Facility Systems for A Hybrid Materials Test Program – 63

TETHERING

Electrodynamic Tether – 33

TETRAHEDRONS

Average Volume of a Random Tetrahedron in a Tetrahedron – 192

TEXAS

Evaluation and Integration of Texas Airports into the Trans-Texas Corridor, Project Summary – 8

TEXTILES

Innovative Mechanism-Based Textile Composite Damage Modeling Basing on a Nonlinear Fiber Model and Enhanced Homogenization Method – 45

Textile Based Ventilation – 61

TEXTS

A Media-Independent Content Language for Integrated Text and Graphics Generation – 193

Nonverbal Behavior Generator for Embodied Conversational Agents – 204

Tasks, Domains, and Languages – 308

Toxic Substances Control Act (TSCA): ASCII Text Data, January 2007, PMN Number to EPA Accession Number Link (Raw Data on CD-ROM) – 41

When is an Embedded MT System 'Good Enough' for Filtering? – 308

XML-Native Constraint Evaluation – 253

THEOREM PROVING

Application of Theorem Proving to Problem Solving – 189

Is Validity of the Convolution Theorem Questionable? – 77

THEOREMS

Nonlinear Dynamic Maximum Power Theorem, with Numerical Method – 233

Toward a Theory of Nonlinear Stochastic Realization – 230

THERAPY

A Phase I/II Study of Combination Neoadjuvant Hormone Therapy and Weekly OGX-011 Prior to Radical Prostatectomy in Patients with Localized Prostate Cancer – 153

A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Glycopetide-Based Immunotherapy for Prophylaxis and Treatment of Mammary Adenocarcinomas – 149

Human Emotional State and its Relevance for Military VR Training – 202

THERMAL ANALYSIS

Probabilistic Thermal Analysis During Mars Reconnaissance Orbiter Aerobraking – 105

Reactive Materials and Thermal Spray Methods of Making Same – 56

THERMAL BATTERIES

Thermally-Related Safety Issues Associated with Thermal Batteries – 130

THERMAL CONDUCTIVITY

Development of GRCop-84 for Rocket Engine Applications – 56

THERMAL CONTROL COATINGS

Development of GRCop-84 for Rocket Engine Applications – 56

Post Irradiation Evaluation of Thermal Control Coatings and Solid Lubricants to Support Fission Surface Power Systems – 114

THERMAL EMISSION

Model Calculations of Solar Spectral Irradiance in the 3.7 Micron Band for Earth Remote Sensing Applications – 141

THERMAL ENERGY

Heat Transfer and Fluid Dynamics Measurements in the Expansion Space of a Stirling Cycle Engine – 37

Model Calculations of Solar Spectral Irradiance in the 3.7 Micron Band for Earth Remote Sensing Applications – 141

THERMAL EXPANSION

Effect of Inclusion Morphology on the Coefficient of Thermal Expansion in Filled Epoxy Matrix (Preprint) – 47

THERMAL MAPPING

Chemical Vapor Detection with a Multispectral Thermal Imager – 109

THERMAL PROTECTION

Arcjet Semi-Elliptic Nozzle Simulations and Validation in Support of TPS Testing – 101

THERMAL STABILITY

High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems – 57

THERMODYNAMIC PROPERTIES

A Review of Manned Thermal Garment Diving Studies With Lessons Learned for the SDV Operator and Combat Swimmer – 299

THERMODYNAMICS

Energy Sustainability – 263

Thermodynamics of Neptunium(V) Fluoride and Sulfate at Elevated Temperatures – 51

– 257

THERMOELECTRIC COOLING

Cooling Enhancement Using Inhomogeneous Thermoelectric Materials – 298

THERMOELECTRIC GENERATORS

Test Report on the November 2005 NATO RTG-40 Active Imager Land Field Trials – 108

THERMOELECTRIC MATERIALS

Cooling Enhancement Using Inhomogeneous Thermoelectric Materials – 298

THERMOELECTRIC POWER GENERATION

Nanoscale Devices for Solid State Refrigeration and Power Generation – 133

THERMOELECTRICITY

Material Optimization for Heterostructure Integrated Thermionic Coolers – 298

Nanoscale Devices for Solid State Refrigeration and Power Generation – 133

THERMOMETERS

Development of the System for Determination of the Size-of-Source Effect – 76

Uncertainty of the Characteristic of the Size-of-Source Effect in Radiation Thermometers – 82

THIN FILMS

Effect of O2 Partial Pressure on YBa2Cu3O7-delta Thin Film Growth by Pulsed Laser Deposition – 54

Enhanced Pinning in YBCO Films with Bazro3 Nanoparticles – 293

Numerical Methods for Analysis of Charged Vacancy Diffusion in Dielectric Solids – 95

Radio Frequency Applications of Barium Strontium Titanate Thin Film Tunable Capacitors – 96

THIOLS

Structure and Function Evolution of Thiolate Monolayers on Gold – 48

THREAT EVALUATION

Between Imprudent and Impossible, Survivability Implications of Threat Analysis or What Threats Should We Design Against – 335

Information Warfare Arms Control: Risks and Costs – 316

THREE BODY PROBLEM

Comparison of Fixed and Variable Time Step Trajectory Integration Methods for Cislunar Trajectories – 231

THREE DIMENSIONAL MODELS

How Does Collisionless Magnetic Reconnection Work in the Presence of a Guide Magnetic Field? – 94

Monitoring of Interaction-Point Parameters Using the 3-Dimensional Luminosity Distribution Measured at Pep-II – 263

Three-Dimensional Computational Model for Flow in an Over-Expanded Nozzle With Porous Surfaces – 1

Wakefield Calculations for 3D Collimators – 295

THRUST CHAMBERS

Development of GRCop-84 for Rocket Engine Applications – 56

THRUSTORS

Control of the ST7 Disturbance Reduction System Flight Experiment – 34

THRUST

Electrodynamic Tether – 33

Powered Descent Trajectory Guidance and Some Considerations for Human Lunar Landing – 331

THUNDERSTORMS

Objective Lightning Probability Forecasting for Kennedy Space Center and Cape Canaveral Air Force Station – 141

THYRATRONS

Application of Tactitron RCA Type 6441 to Pulse Circuitry – 98

TIBIA

Do Capacitively Coupled Electric Fields Accelerate Tibial Stress Fracture Healing – 86

TILES

High Power Spatial Combiners: Tile and Tray Approaches – 99

TIME DEPENDENCE

Measurement of Time-Dependent CP Asymmetries in B(sup 0) Yields K(sup 0)(sub s) Decays. The BABAR Collaboration – 268

TIME DOMAIN ANALYSIS

Some Issues at Sampled-Data Identification and Conversion of the Identified Models into the Continuous-Time Domain – 75

TIME MEASUREMENT

Uncertainty Analysis of Historical Hurricane Data – 146

TIME SERIES ANALYSIS

Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 125

TIME SHARING

E-LOTOS-Based Compositional Service-Based Synthesis of Multi-Party Time-Sharing-Based Protocols – 77

TIME

Acquisition of Time-Varying Participating Media – 107

Fitting APD Restitution with Artificial Neural Network – 174

TISSUES (BIOLOGY)

An Optimization of Pulsed ElectroMagnetic Fields Study – 156

Bone Geometry as a Predictor of Tissue Fragility and Stress Fracture Risk – 151

TITAN ATMOSPHERE

Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

TITANIUM ALLOYS

Comparative Corrosion Behavior of Two Palladium-Containing Titanium Alloys – 50

TITANIUM

17Beta-Estradiol Modulates the Response of Human Osteoblasts to Titanium Surface Roughness – 58

Effect of Strain-Path Reversal on Microstructure Evolution and Cavitation During Hot Torsion Testing of Ti-6A1-4V (Preprint) – 56

TITAN

Titan Orbiter with Aerorover Mission (TOAM) – 319

TOCOPHEROL

Protective Effects of Vitamin E on Injury to Male Reproductive Function in Tail-suspended Rats – 179

TOMOGRAPHY

A Wavelet-Based Method for Multiscale Tomographic Reconstruction – 257

Lu(sup 1)xI(sup 3):Ce(sup x): A Scintillator for Gamma Ray Spectroscopy and Time-Of Flight Pet – 266

Randomized Trial of Neuroprotective Effects of Erythropoietin in Patients Receiving Adjuvant Chemotherapy for Breast Cancer: Position Emission Tomography and NE – 171

Very Fast Doped LaBr(sup 3) Scintillators and Time-Of-Flight Pet – 266

TOPEX

Multiresolution Optimal Interpolation and Statistical Analysis of Topex/Poseidon Satellite Altimetry – 238

TOPOGRAPHY

Assessment of Historic Landscape, Highway 45 Borrow Pit, Jefferson Parish, Louisiana – 124

TOPOLOGY

A Novel Power-Efficient Broadcast Routing Algorithm Exploiting Broadcast Efficiency – 133

Analysis of Industrial Power Networks – 80

Feedback Linearized Aircraft Control Using Dynamic Cell Structure – 25

Structures Including Network and Topology for Identifying, Locating and Quantifying Physical Phenomena – 39

TORQUE

Modulation in Stator Flux Control of Induction Motor for Reduced Torque Ripple – 77

TORSION
Effect of Strain-Path Reversal on Microstructure Evolution and Cavitation During Hot Torsion Testing of Ti-6A1-4V (Preprint) – 56

TORUSES
Efficient Subtorus Processor Allocation in a Multi-Dimensional Torus – 197

TOUCH
Human Haptic Interaction with Soft Objects: Discriminability, Force Control, and Contact Visualization – 182

Sensorimotor Interactions in the Haptic Perception of Virtual Objects – 182

TOWERS
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Analysis of Aircraft Impacts into the World Trade Center Towers. Appendix A. Still Images of the Video Records Used in Chapter 7 – 119

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety Systems of the World Trade Center Towers. NIST NCSTAR 1-1H – 121

TOXIC HAZARDS
Round Robin Testing Exercise on Method 8C of the STANAG 4360 – 59

TOXICITY
CETIS: Complex Effluents Toxicity Information System. CETIS Retrieval System User's Manual – 306

Toxic Substances Control Act (TSCA): ASCII Text Data, January 2007, PMN Number to EPA Accession Number Link (Raw Data on CD-ROM) – 41

Toxicological Evaluation of Depleted Uranium in Rats: Six-Month Evaluation Point – 168

TRACKING (POSITION)
A Deception Repeater for Conical-Scan Automatic Tracking Radars – 108

TRADEOFFS
Game Theory and Trade-Off Analysis – 190

TRAFFIC
Use of Weather Data to Predict Non-Recurring Traffic Congestion – 143

TRAILING EDGES
Parametric Evaluation of Thin, Transonic Circulation-Control Airfoils – 3

TRAINING DEVICES
Intelligent Agents for Computer-Generated Forces – 9

R&D Advances in USAF Pilot Training – 9

TRAINING SIMULATORS
Development of a Portable Simulator for Training Robot Assisted Surgery – 220

TRAJECTORIES
Comparison of Fixed and Variable Time Step Trajectory Integration Methods for Cislunar Trajectories – 231

Effects of Speed and Visual-Target Distance on Toe Trajectory During the Swing Phase of Treadmill Walking – 157

Numerical Skip-Entry Guidance – 32

TRAJECTORY CONTROL
AO Group Annual Report – 320

Powered Descent Trajectory Guidance and Some Considerations for Human Lunar Landing – 331

TRANSDUCERS
Ionic Solvents Used in Ionic Polymer Transducers, Sensors and Actuators – 41

Performance, Thermal, and Vibration Qualification Testing of Zetec Acoustic Transducers, Model Z0002659-2, Sondicator Probes – 282

Training Tree Transducers – 230

TRANSFERRING
The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer – 157

TRANSFORMATIONS (MATHEMATICS)
Fractionated Spacecraft Architectures Seeding Study – 30

TRANSFORMERS
Importance of Cooling System Optimization with Regard to Lifetime and Reliability of Power Transformers – 76

TRANSIENT HEATING
A Simplified Approach for the Rapid Generation of Transient Heat-Shield Environments – 34

TRANSITION FLIGHT
Discrete Roughness Transition for Hypersonic Flight Vehicles – 3

TRANSITION METALS
Methods and Apparatuses for Producing Metallic Compositions via Reduction of Metal Halides – 55

TRANSLATING
A Detailed Look at Scale and Translation Invariance in a Hierarchical Neural Model of Visual Object Recognition – 224

TRANSMISSION ELECTRON MICROSCOPY
Biological Applications and Transmission Electron Microscopy Investigation of Mesoporous Silica Nanoparticles – 49

TRANSMISSION LINES
Analysis of Flicker Levels in the Slovenian Transmission Network – 82

TRANSMITTERS
A HF Pulsed Transmitter for an Experimental Cross-Correlation Radar System – 108

TRANSONIC SPEED
Parametric Evaluation of Thin, Transonic Circulation-Control Airfoils – 3

TRANSONIC WIND TUNNELS
Progress in Flaps Down Flight Reynolds Number Testing Techniques at the NTF – 12

TRANSPARENCE
Transparent Yttria for IR Windows and Domes - Past and Present – 292

TRANSPLANTATION
Bucky Paper as a Support Membrane in Retinal Cell Transplantation – 149

TRANSPORT AIRCRAFT
C-17A Special Operations Low Level II (SOLL II) Supporting the Combatant Commander – 13

Transport Bombers: A Conceptual Shift in Precision-Guided Munitions Delivery – 16

TRANSPORTATION
An Optimal Parallel Implementation of a Quadratic Transportation Algorithm – 206

Biological Restoration of Major Transportation Facilities Domestic Demonstration and Application Project (DDAP): Technology Develop(ment aat Sandia National Laboratories – 60

Case Study: Ebus Hybrid Electric Buses and Trolleys – 113

Evaluation of Utility System Impacts and Benefits of Optimally Dispatched Plug-In Hybrid Electric Vehicles – 82

National Transportation Safety Board Aircraft Accident Report: Runway Overrun and Collision, Platinum Jet Management, LLC, Bombardier Challenger CL-600-1A11, N370V, Teterboro, New Jersey, on February 2, 2005 – 6

Present and Future Diagnostics and Prognostics of Ground Combat Vehicles – 318

The Bekker Model Analysis for Small Robotic Vehicles – 229

TRANSVERSE MOMENTUM
Factorization and Transverse Momentum in SIDIS at JLab – 277

QT-Reummation for Polarized Semi-Inclusive Deep Inelastic Scattering – 260

TRAYS
High Power Spatial Combiners: Tile and Tray Approaches – 99

TREADMILLS
A Hypothetical Perspective on the Relative Contributions of Strategic and Adaptive Control Mechanisms in Plastic Recalibration of Locomotor Heading Direction – 155

Effects of Speed and Visual-Target Distance on Toe Trajectory During the Swing Phase of Treadmill Walking – 157

TRENDS
Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions – 144

Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences. Synthesis and Assessment Product 1.1 – 143

Trends and Opportunities in Photonics Technologies: Solid-State Lighting and Healthcare – 87

TRIBOLOGY

Application of Carbon Based Nano-Materials to Aeronautics and Space Lubrication – 114

Molybdenum Disulfide as a Lubricant And Catalyst in Adaptive Nanocomposite Coatings (Preprint) – 53

Turbomachinery Clearance Control – 115

TRITIUM

PNNL OS3700 Tritium Monitoring System Software and Hardware Operations Manual Rev. 0 – 197

TROUGHS

Trough Receiver Heat Loss Testing – 129

TUMORS

HOXB7: An Oncogenic Gene in Breast Cancer – 153

Identification of the Downstream Promoter Targets of Smad Tumor Suppressors in Human Breast Cancer Cells – 160

Naked DNA Immunization of Prevention of Prostate Cancer in a Dunning Rat Prostate Tumor Model – 172

Novel Angiogenic Domains: Use in Identifying Unique Transforming and Tumor Promoting Pathways in Human Breast Cancer – 162

Restoration of Epithelial Polarity in Metastatic Tumors – 150

The Role of C-SRC Activation in Prostate Tumor Progression – 153

TUNGSTEN

Fracture Toughness and Strength in a New Class of Bainitic Chromium-Tungsten Steels – 46

TUNING

Enhancement of Stochastic Resonance by Tuning System Parameters and Adding Noise Simultaneously – 248

Zeeman Tuning Rates in the v3 Band of NO2 – 110

TURBINES

Combustion Turbine (CT) Hot Section Coating Life Management. (Final Report) – 60

TURBOFAN ENGINES

Aerodynamic Performance Measurements for a Forward Swept Low Noise Fan – 2

TURBOMACHINERY

Turbomachinery Clearance Control – 115

TURBULENCE MODELS

Assessment of Turbulent Shock-Boundary Layer Interaction Computations Using the OVERFLOW Code – 101

TURBULENCE

Analysis and Modeling of Surfzone Turbulence and Bubbles – 106

Turbulence and Mountain Wave Conditions Observed with an Airborne 2-Micron Lidar – 19

Validation Experiments to Determine Radiation Partitioning of Heat Flux to an Object in a Fully Turbulent Fire – 104

TURBULENT BOUNDARY LAYER

Fluorescence Visualization of Hypersonic Flow Past Triangular and Rectangular Boundary-layer Trips – 4

Optimal Control of Shock Wave Turbulent Boundary Layer Interactions Using Micro-Array Actuation – 2

TURBULENT MIXING

– 257

TWO DIMENSIONAL MODELS

Efficient Implementations of 2-D Noncasual IIR Filters – 234

ULTRAHIGH FREQUENCIES

Delta-Sigma UHF Digital Waveform Generator – 280

ULTRASONICS

Monitoring Cancer Oxygenation Changes Induced by Ultrasound – 150

Noninvasive Characterization of a Flowing Multiphase Fluid Using Ultrasonic Interferometry – 102

UNCERTAIN SYSTEMS

Choosing the Link Function and Accounting for Link Uncertainty in Generalized Linear Models using Bayes Factors – 192

Optimally Robust Redundancy Relations for Failure Detection in Uncertain Systems – 216

Sensitivity in Risk Analyses with Uncertain Numbers – 191

UNDERWATER ACOUSTICS

A Wavelet Packet Approach to Transient Signal Classification – 284

UNDERWATER VEHICLES

Crawler Control Strategies and Their Influence on Mine Finding Capabilities – 222

UNITED STATES

Border Security: Barriers Along the U.S. International Border – 117

Index to FAA Office of Aerospace Medicine Reports: 1961 through 2004 – 17

Information Warfare and International Law – 314

Inventory of Sources and Environmental Releases of Dioxin-Like Compounds in the USA for the Years 1987, 1995, and 2000 – 138

Northwest Forest Plan-The First 10 Years (1994-2003): Synthesis of Monitoring and Research Results – 136

The Development of a Business Case Analysis for the Acquisition of the Agile Rapid Global Combat Support System Used for the USA Marine Corps' Ground Equipment – 66

UNIVERSE

Nuclear Reaction and Structure Databases of the National Nuclear Data Center – 323

UNMANNED GROUND VEHICLES

Intelligent Mobility Laboratory – 66

Rudimentary Force Feedback for Safe Guarded Teleoperation of Unmanned Vehicles: A Simulations and Training Approach – 223

UNSTRUCTURED GRIDS (MATHEMATICS)

HARP: A Fast Spectral Partitioner – 231

USM3D Unstructured Grid Solutions for CAWAPI at NASA LaRC – 13

UPGRADING

Lean Six Sigma for Reduced Cycle Costs and Improved Readiness – 317

UPPER STAGE ROCKET ENGINES

Crew Exploration Vehicle Ascent Abort Coverage Analysis – 31

URANIUM

Fuel-Cladding Interaction Layers in Irradiated U-Zr and U-Pu Zr Fuel Elements – 40

Toxicological Evaluation of Depleted Uranium in Rats: Six-Month Evaluation Point – 168

URINE

Natural Calcium Isotopic Composition of Urine as a Marker of Bone Mineral Balance – 156

USER MANUALS (COMPUTER PROGRAMS)

CETIS: Complex Effluents Toxicity Information System. CETIS Retrieval System User's Manual – 306

Software User's Manual for the Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS) – 140

User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 208

USER REQUIREMENTS

UMass at TREC 2004: Novelty and HARD – 310

Using Human Systems Integration and Knowledge Engineering to Define and Design Anti-Terrorism/Force Protection Systems and Solutions – 183

UTILITIES

Energy and Utilities Readiness for the Army Industrial Activities – 133

Evaluation of Utility System Impacts and Benefits of Optimally Dispatched Plug-In Hybrid Electric Vehicles – 82

Tariff Analysis Project: A Database and Analysis Platform for Electrictiy Tariffs – 306

UTILIZATION

New Real-time Modeling and Simulation Products and Applications – 191

VACCINES

Enhancing the Immunogenicity of a Dengue-2 DNA Vaccine with Adjuvants and Anti-Fc(gamma)RI Antibodies – 163

VACUUM CHAMBERS

Novel Chamber Design for an In-Vacuum Cryo-Cooled Mini-Gap Undulator – 274

VACUUM SYSTEMS

Pressure Model for the Vacuum System for the Electron Gun and Injector for LCLS Final Design Report – 272

VACUUM TESTS

Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel – 26

VACUUM

Novel Chamber Design for an In-Vacuum Cryo-Cooled Mini-Gap Undulator – 274

Solid-State and Vacuum Thermionic Energy Conversion – 134

VAPOR DEPOSITION

Aluminum Nitride Substrate Growth by Halide Vapor Transport Epitaxy – 53

VAPORS

Aluminum Nitride Substrate Growth by Halide Vapor Transport Epitaxy – 53

Chemical Vapor Detection with a Multispectral Thermal Imager – 109

Passive Badge Assessment for Long-Term, Low-Level Air Monitoring on Submarines: VOC Badge Validation – 44

VARIABILITY

Use of Stochastic Modeling of Stratigraphic Relationships in High Resolution Seismic Reflection Data for Prediction of the Distribution of Acoustic and Geotechnical Property Variability in Near Surface Sediments on the East China Sea Continental Margin – 127

VARIATIONS

Acquisition of Time-Varying Participating Media – 107

Modeling the Observed Solar Cycle Variations of the Quasi-biennial Oscillation (QBO): Amplification by Wave Forcing – 144

VASOCONSTRICTOR DRUGS

Effects of Tail Suspension on Renin-angiotensin System in Rat Myocardium – 177

VECTOR ANALYSIS

Vector-Valued Support Vector Regression – 192

VECTOR PROCESSING (COMPUTERS)

Face Recognition with Support Vector Machines: Global versus Component-Based Approach – 205

Standardization of Object Oriented Extensions to Vector Signal and Image Processing Library (VSIPL) – 209

VECTORS (MATHEMATICS)

Exact Attractive Non-BPS STU Black Holes – 326

Vector-Valued Support Vector Regression – 192

VEHICLES

A Support Vector Machine Application on Vehicles – 107

VELOCITY DISTRIBUTION

Simultaneous Inversion of Velocity and Density Profiles – 237

Simultaneous Linearized Inversion of Velocity and Density Profiles for Multidimensional Acoustic Media – 282

VELOCITY MEASUREMENT

Automation & Characterization of US Air Force Bench Top Wind Tuunnels. Summary Report – 27

VELOCITY

Effects of Speed and Visual-Target Distance on Toe Trajectory During the Swing Phase of Treadmill Walking – 157

VENTILATION

Clothing Ventilation Estimates From Manikin Measurements – 185

Design of a Wearable Respiratory Inductive Plethysmograph and Its Applications – 178

Energy Savings with a Scalable Source Capture Ventilation – 140

Forced Ventilation of Protective Garments for Hot Industries – 185

Resistance of HEPA Filters in a Ventilation Duct on Leakpath Factor Calcuations – 137

Textile Based Ventilation – 61

VERBAL COMMUNICATION

Safety and Usability of Speech Interfaces for In-Vehicle Tasks while Driving: A Brief Literature Review – 184

VERY LARGE ARRAY (VLA)

GRO J1655-40: Early Stages of the 2005 Outburst – 320

VERY LARGE SCALE INTEGRATION

Graph-based Representations and Coupled Verification of VLSI Schematics and Layouts – 95

Macromodeling CMOS Circuits for Timing Simulation – 94

VERY LOW FREQUENCIES

VLF Signal Reception Capability of Three Experimental Crossed-Loop Antennas – 84

VESTS

Use of a Spacer Vest to Increase Evaporative Cooling Under Military Body Armor – 297

VIBRATION DAMPING

Functionally Graded Shape Memory Alloy Composites Optimized for Passive Vibration Control – 45

VIBRATION

Enhancing Bone Accretion Using Short Duration, Low-Level Mechanical Vibrations – 154

Performance, Thermal, and Vibration Qualification Testing of Zetec Acoustic Transducers, Model Z0002659-2, Sondicator Probes – 282

VIDEO COMMUNICATION

Feature Normalization for Video Indexing and Retrieval – 302

VIDEO SIGNALS

A Wide-Band Video Noise Source, 50 KC to 10 MC – 108

Preserving Privacy by De-identifying Facial Images – 73

VIEWING

External View of the DARPA Grand Challenge – 336

Hierarchical Role-based Viewing for Multi-level Information Security in Collaborative CAD – 307

VIRTUAL REALITY

A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Applying Perceptually Driven Cognitive Mapping to Virtual Urban Environments – 229

Building Robust Planning and Execution Systems for Virtual Worlds – 203

Creating Interactive Virtual Humans: Some Assembly Required – 205

Development of a Data Management Tool for Investigating Multivariate Space and Free Will Experiences in Virtual Reality – 201

Human Emotional State and its Relevance for Military VR Training – 202

Mixing Story and Simulation in Interactive Narrative – 203

Modeling Dynamic Perceptual Attention in Complex Virtual Environments – 200

NL Generation for Virtual Humans in a Complex Social Environment – 207

Scalable Solutions for Interactive Virtual Humans that can Manipulate Objects – 202

Simulation Meets Hollywood: Integrating Graphics, Sound, Story and Character for Immersive Simulation – 200

The Fidelity of ‘Feel’: Emotional Affordance in Virtual Environments – 203

Toward a New Generation of Virtual Humans for Interactive Experiences – 205

Virtual Design and Testing of Materials: A Multiscale Approach – 40

VISUAL ACUITY

Effects of Speed and Visual-Target Distance on Toe Trajectory During the Swing Phase of Treadmill Walking – 157

VISUAL FIELDS

Investigating Shape Representation in Area V4 with HMAX: Orientation and Grating Selectivities – 224

VISUAL PERCEPTION

A Comparison of Mamdani and Sugeno Methods for Modeling Visual Perception Lab Data – 252

Perceptual Evaluation of Video-Realistic Speech – 71

Preserving Privacy by De-identifying Facial Images – 73

Specification for Visual Requirements of Work-Centered Software Systems – 211

VOICE COMMUNICATION

Dual Use of Commercial Avionics Data Links for the U.S. Air Force – 73

VOLATILE ORGANIC COMPOUNDS

Passive Badge Assessment for Long-Term, Low-Level Air Monitoring on Submarines: VOC Badge Validation – 44

VOLUME

Average Volume of a Random Tetrahedron in a Tetrahedron – 192

VORTICES

Aerodynamic Analysis of Body-Strake Configurations – 5

VOYAGER 1 SPACECRAFT

Trains of Magnetic Holes and Magnetic Humps in the Heliosheath – 326

VULNERABILITY

EM Threat Analysis for Wireless Systems – 71

WAFERS

Gallium Nitride Crystals and Wafers and Method of Making – 265

WALKING

Direction Estimation of Pedestrian from Images – 292

Effects of Speed and Visual-Target Distance on Toe Trajectory During the Swing Phase of Treadmill Walking – 157

The Effect of a Home-Based Walking Intervention on Quality of Life, Body Composition, and Estrogen Metabolism in Postmenopausal Breast Cancer Survivors – 169

WALLS

Analysis Procedures for Double-Shell Target Concentricity and Wall Thickness – 271

Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

WARFARE

A Need to Know: The Role of Air Force Reconnaissance in War Planning, 1945-1953 – 17

A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Information Warfare and International Law – 314

Information Warfare Arms Control: Risks and Costs – 316

State of the Art in Anomaly Detection and Reaction: An Update – 207

The National Biodefense Analysis and Countermeasures Center: Issues for Congress – 152

Using Computer Games to Train Information Warfare Teams – 208

WARNING SYSTEMS

Between Imprudent and Impossible, Survivability Implications of Threat Analysis or What Threats Should We Design Against – 335

Intrusion Detection for Air Force Networks: Environment Forecast – 67

Intrusion Detection for Air Force Networks: Operational, Performance, and Implementation Goals – 67

Intrusion Detection System Requirements. A Capabilities Description in Terms of the Network Monitoring and Assessment Module of CSAP21 – 215

WASTE DISPOSAL

Installation and Sampling of Observation Wells and Analyses of Water From the Shallow Aquifer at Selected Waste-Disposal Sites in the Memphis Area, Tennessee – 123

WASTE MANAGEMENT

Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository – 51

LLNL Heavy Element Facility-Facility Management, Authorization Basis, and Readiness Assessment Lessons Learned in the Heavy Element Facility (B251) Transition from Category II Nuclear Facility to Radiological Facility – 137

WATER CURRENTS

Boussinesq Modeling of Alongshore Swash Zone Currents – 102

WATER EROSION

Evaluating a Prefabricated Submerged Breakwater and Double-T Sill for Beach Erosion Prevention, Cape May Point, NJ – 147

National Shoreline Erosion Control Demonstration Program Overview – 147

WATER LANDING

Numerical Skip-Entry Guidance – 32

WATER MANAGEMENT

ESPC Issues: DOE Super Energy Savings Performance Contracts – 134

WATER POLLUTION

CETIS: Complex Effluents Toxicity Information System. CETIS Retrieval System User's Manual – 306

WATER QUALITY

Ground-Water Quality Data From the Northern Mississippi Embayment--Arkansas, Missouri, Kentucky, Tennessee, and Mississippi – 123

WATER RESOURCES

Risk-Based Decision Support of Water Resource Management Alternatives – 251

Water Resources Publications of the U.S. Geological Survey for Tennessee, 1906-1987 – 124

WATER TABLES

Chemical Character of Ground Water in the Shallow Water-Table Aquifer at Selected Localities in the Memphis Area, Tennessee – 38

WATER

Chemical Analyses of Water Samples From the Picher Mining Area, Northeast Oklahoma and Southeast Kansas – 38

Construction, Geologic, and Water-Level Data for Observation Wells Near Brentwood, Williamson County, Tennessee – 124

How Accurately Can We Calculate Neutrons Slowing Down in Water – 271

Installation and Sampling of Observation Wells and Analyses of Water From the Shallow Aquifer at Selected Waste-Disposal Sites in the Memphis Area, Tennessee – 123

Investigating the Interface of Superhydrophobic Surfaces in Contact With Water – 47

Navy Energy/Water Program and Applicable Process Technologies – 133

Projected Life of the SLAC Linac Braze Joints: Braze Integrity and Corrosion of Cooling Water Hardware on Accelerator Sections – 278

WAVE DISPERSION

Scattering of Evanescent Acoustic Waves by Regular and Irregular Objects – 282

WAVE FRONTS

AO Group Annual Report – 320

Initial Demonstration of Mercury Wavefront Correction System – 287

WAVE INTERACTION

Optimal Control of Shock Wave Turbulent Boundary Layer Interactions Using Micro-Array Actuation – 2

WAVE PROPAGATION

Boussinesq Modeling of Alongshore Swash Zone Currents – 102

WAVEFORMS

Characterization of Materials with Optically Shaped Acoustic Waveforms – 272

Delta-Sigma UHF Digital Waveform Generator – 280

WAVEGUIDE ANTENNAS
FDTD Analysis of a New Leaky Traveling Wave Antenna – 234

WAVELENGTHS
The Throughput of Wavelength Routing Networks – 84

WAVELET ANALYSIS
A Multiscale Approach to Solving One Dimensional Inverse Problems – 187

A Wavelet Packet Approach to Transient Signal Classification – 283

A Wavelet-Based Method for Multiscale Tomographic Reconstruction – 256

Multiscale Representations of Markov Random Fields – 243

Parsimony and Wavelet Methods for Denoising – 283

WEAPON SYSTEMS
Robotic Follower Experimentation Results – 225

WEAR
Ultra-Hard Low Friction Coating Based on ALMGB14 for Reduced Wear on MEMS and Other Tribiological Components and System – 59

WEATHER FORECASTING
Objective Lightning Probability Forecasting for Kennedy Space Center and Cape Canaveral Air Force Station – 141

WEATHER
Calibrated Probabilistic Mesoscale Weather Field Forecasting: The Geostatistical Output Perturbation (GOP) Method – 146

Intelligent Weather Agent – 112

WEIGHT MEASUREMENT
Weight Measurements and Standards for Soldiers – 165

WEIGHTLESSNESS
Electron Beam Freeform Fabrication in the Space Environment – 319

WELD TESTS
Effect of Solution Annealing on Alloy 22 Weld Properties – 54

WELDING
In-Situ Observation of Phase Transformations During Welding of 1045 Steel Using Spatially Resolved and Time Resolved X-Ray Diffraction – 57

Polymerization Welding and Application to Microfluidics – 60

WELLS
Construction, Geologic, and Water-Level Data for Observation Wells Near Brentwood, Williamson County, Tennessee – 124

Installation and Sampling of Observation Wells and Analyses of Water From the Shallow Aquifer at Selected Waste-Disposal Sites in the Memphis Area, Tennessee – 123

WHITE DWARF STARS
The ROSSI X-Ray Timing Explorer: Capabilities, Achievements and Aims – 325

WIGGLER MAGNETS
Low-Voltage Infrared Free-Electron Lasers Based on Gyrotron-Powered RF Wigglers – 111

Novel Chamber Design for an In-Vacuum Cryo-Cooled Mini-Gap Undulator – 274

WIND TUNNEL MODELS
Angle Measurement System (AMS) for Establishing Model Pitch and Roll Zero, and Performing Single Axis Angle Comparisons – 25

Fluorescence Visualization of Hypersonic Flow over Rapid Prototype Wind-Tunnel Models – 4

WIND TUNNEL TESTS
Arcjet Semi-Elliptic Nozzle Simulations and Validation in Support of TPS Testing – 101

High-Lift System for a Supercritical Airfoil: Simplified by Active Flow Control – 14

Parametric Evaluation of Thin, Transonic Circulation-Control Airfoils – 3

Progress in Flaps Down Flight Reynolds Number Testing Techniques at the NTF – 12

Review of Cranked-Arrow Wing Aerodynamics Project: Its International Aeronautical Community Role – 12

WIND TUNNELS
Automation & Characterization of US Air Force Bench Top Wind Tuunnels. Summary Report – 27

Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel – 26

WIND TURBINES
International Electrotechnical Commission Standard IEC 61400-11 and Other Procedures. Acoustic Noise Measurement Techniques – 283

WINDING
Fractional-Slot Surface Mounted PM Motors with Concentrated Windings for HEV Traction Drives – 85

WINDOWS (COMPUTER PROGRAMS)
Evaluation of TCP Congestion Control Algorithms on the Windows Vista Platform – 264

WINDPOWER UTILIZATION
Calibrated Probabilistic Forecasting at the Stateline Wind Energy Center: The Regime-Switching Space-Time (RST) Method – 147

WINTER
Analysis of Wintertime Winds in Washington, D.C – 141

WIRELESS COMMUNICATION
A Comparison of Power-Efficient Broadcast Routing Algorithms – 132

A Near-Optimum Channel Access Protocol Based on Incremental Collision Resolution and Distributed Transmission Queues – 217

A Novel Power-Efficient Broadcast Routing Algorithm Exploiting Broadcast Efficiency – 132

A Set-Covering Approach for Modeling Attacks on Key Predistribution in Wireless Sensor Networks – 214

Cross-Layer Design and Optimization for Wireless Sensor Networks – 73

Cross-Layer Design for Energy-Efficient Secure Multicast Communications in Ad Hoc Networks – 132

Floor Acquisition Multiple Access with Collision Resolution – 216

Hardware-in-the-Loop Testing of Wireless Systems in Realistic Environments – 70

Maximizing Static Network Lifetime of Wireless Broadcast Adhoc Networks – 131

Performance Analysis of Adaptive Transmission Aided by Long Range Channel Prediction for Realistic Single- and Multi-Carrier Mobile Radio Channels – 71

Secure Broadcast in Energy-Aware Wireless Sensor Networks – 131

VP3: Using Vertex Path and Power Proximity for Energy Efficient Key Distribution – 131

WIRE
Method and System for Identifying Damage to a Wire – 93

Methods and Systems for Detecting and Locating Damage in a Wire – 92

Methods and Systems for Testing Wire Insulation – 92

WIRING
Method and System for Determining the Position of a Short Circuit in a Branched Wiring System – 92

WISCONSIN
Drainage-Area Data for Wisconsin Streams – 123

WORDS (LANGUAGE)
Experiments in Speech Understanding System Control – 68

Statistical Alignment Models in Machine Translation from Slovenian to English – 186

WORKLOADS (PSYCHOPHYSIOLOGY)
A Network Optimization Approach for Improving Organizational Design – 248

WORKSTATIONS
Energy Savings with a Scalable Source Capture Ventilation – 140

WORLD WIDE WEB
Security Guards for the Future Web – 214

X RAY BINARIES
GRO J1655-40: Early Stages of the 2005 Outburst – 320

X RAY DIFFRACTION
In-Situ Observation of Phase Transformations During Welding of 1045 Steel Using Spatially Resolved and Time Resolved X-Ray Diffraction – 57

X RAY IMAGERY
Time-Resolved Soft X-Ray Imaging (SXRI) Diagnostic for Use at the NIF and OMEGA Lasers – 271

X RAY OPTICS
SLS Optics Beamline – 265

X RAY SCATTERING
Solid-Density Plasma Characterization with X-Ray Scattering on the 200-J Janus Laser – 271

X RAY SOURCES
Solid-Density Plasma Characterization with X-Ray Scattering on the 200-J Janus Laser – 271

X-Ray Spectral Study of the Photoionized Stellar Wind in Vela X-1 – 324

X RAY TIMING EXPLORER
The ROSSI X-Ray Timing Explorer: Capabilities, Achievements and Aims – 325

X RAYS
Adaptive Bayesian Signal Reconstruction with A Priori Model Implementation and Synthetic Examples for X-Ray Crystallography – 242

Black Hole Spectral States and Physical Connections – 322

Effects of Irradiation with Different Dose Rates of X-ray on Mouse Immune System – 177

High Energy X-Ray Imager for Inertial Confinment Fusion at the National Ignition Facility – 272

Multispectral X-Ray Imaging for Core Temperature and Density Maps Retrieval in Direct Drive Implosions – 272

Phase Effects on Mesoscale Object X-ray Attenuation Radiographs – 259

The Swift/BAT Hard X-ray Survey – 321

X-Ray Spectral Study of the Photoionized Stellar Wind in Vela X-1 – 324

YBCO SUPERCONDUCTORS
Effect of O2 Partial Pressure on YBa2Cu3O7-delta Thin Film Growth by Pulsed Laser Deposition – 54

Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint) – 61

YTTRIUM OXIDES
Enhanced Pinning in YBCO Films with Bazro3 Nanoparticles – 294

Transparent Yttria for IR Windows and Domes - Past and Present – 292

ZEEMAN EFFECT
Zeeman Tuning Rates in the v3 Band of NO2 – 111

ZINC ALLOYS
Precipitation in Al-Zn-Mg-Cu Alloys Modified With Sc and Zr During Aging (Preprint) – 55

ZIRCONIUM
Fuel-Cladding Interaction Layers in Irradiated U-Zr and U-Pu Zr Fuel Elements – 40

Personal Author Index

Abadie, Marc J.
Crew Exploration Vehicle Ascent Abort Coverage Analysis – 31

Abderrahim, H. A.
LFR Lead Cooled Fast Ractor – 270

Abdol-Hamid, K. S.
Three-Dimensional Computational Model for Flow in an Over-Expanded Nozzle With Porous Surfaces – 1

Abdol-Hamid, Khaled S.
USM3D Unstructured Grid Solutions for CAWAPI at NASA LaRC – 13

AbdulJaleel, Nasreen
UMass at TREC 2003: HARD and QA – 312

Abdul-Jaleel, Nasreen
UMass at TREC 2004: Novelty and HARD – 310

Abela, R.
SLS Optics Beamline – 265

Abraham, James
Randomized Trial of Neuroprotective Effects of Erythropoietin in Patients Receiving Adjuvant Chemotherapy for Breast Cancer: Position Emission Tomography and NE – 171

Abrahms, Briana L.
A Dynamic/Anisotropic Low Earth Orbit (LEO) Ionizing Radiation Model – 334

Abramson, Mark A
Characteristic Shape Sequences for Measures on Images – 252

Abu-Gazaleh, Nael
Using Heterogeneous High Performance Computing Cluster for Supporting Fine-Grained Parallel Applications – 199

Acuna, Mario
Trains of Magnetic Holes and Magnetic Humps in the Heliosheath – 325

Adams, Catherine A.
Human Factors Considerations for Performance-Based Navigation – 5

Adderley, P.
New High Capacity Getter for Vacuum Insulated Mobile Liquid Hydrogen Storage Systems – 105

Adey, D.
Direct Measurement of Geometric and Resistive Wakefields in Tapered Collimators for the International Linear Collider – 267

Adolphsen, C.
ILC Linac R and D at SLAC – 276

Adrian, M. L.
Origin and Evolution of Deep Plasmaspheric Notches – 326

Ahuja, Vineet
Runtime and Pressurization Analyses of Propellant Tanks – 36

Ajayan, P. M.
Carbon Nanotube Filter – 41

Akre, R.
Design and Testing of Gproto bunch-by-bunch Signal Processor – 294

Aksit, Mahmut F.
Turbomachinery Clearance Control – 115

Al, Wei-dang
Development of a Complex Experimental System for Studies of Controlled Ecological Life Support Technique – 175

Alatishe, Jimmy O
Delta-Sigma UHF Digital Waveform Generator – 280

Albanese, Richard A
The Inverse Source Problem for Maxwell's Equations – 231

Alderfer, D. W.
Fluorescence Visualization of Hypersonic Flow over Rapid Prototype Wind-Tunnel Models – 4

Alderfer, David W.
Fluorescence Visualization of Hypersonic Flow Past Triangular and Rectangular Boundary-layer Trips – 4

Aldrich, Eric
Calibrated Probabilistic Forecasting at the Stateline Wind Energy Center: The Regime-Switching Space-Time (RST) Method – 147

Allan, James
UMass at TREC 2002: Cross Language and Novelty Tracks – 228

UMass at TREC 2003: HARD and QA – 312

UMass at TREC 2004: Novelty and HARD – 310

Allauzen, Cyril
A Unified Construction of the Glushkov, Follow, and Antimirov Automata – 219

Allen, Brian
A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Allen, C. C.
Layered Sediments, Rampart Craters, and Potential Fluvio-Lacustrine Activity in S.W. Arabia Terra, Mars: Support for a History of Aqueous Conditions – 332

Allen, L. H.
Tem Mems Device Holder and Method of Fabrication – 93

Allen, Michael J.
Guidance and Control of an Autonomous Soaring UAV – 25

Allen, Tracy L
Foundations in the Law: Classic Cases in Medical Ethics – 159

Allison, Stephen C
Preliminary Derivation of Test Item Clusters for Predicting Injuries, Poor Physical Performance, and Overall Attrition in Basic Combat Training – 253

Allison, T.
Jefferson Lab's Distributed Data Acquisition – 296

Allman, S. L.
High Sensitivity Array-Based Detection System – 94

Allton, J. H.
Decontamination of Genesis Array Materials by UV Ozone Cleaning – 329

Allwine, K. J.
Analysis of Wintertime Winds in Washington, D.C – 141

Almogy, Gilad
Direct Measurement of Population-Induced Broadening of Quantum Well Intersubband Transitions – 284

Alsharo'a, M.
High Field Solenoid Magnets for Muon Cooling – 261

Alstad, J. P.
Fast Access, Low Memory, Pair Catalog – 1

Altendorfer, Richard
Towards a Factored Analysis of Legged Locomotion Models – 229

Althouse, Mark L G
Chemical Vapor Detection with a Multispectral Thermal Imager – 109

ALthouse, Mark L
Target Detection in Multispectral Images using the Spectral Co-Occurrence Matrix and Entropy Thresholding – 284

Altstatt, Richard L.
Radiation and Plasma Environments for Lunar Missions – 333

Alves-Foss, Jim
How to Prevent Type-Flaw Guessing Attacks on Password Protocols – 215

Implementation-Oriented Secure Architectures – 214

Ambrosio, A. M.
Polymeric Bioresorbable Composites Containing an Amorphous Calcium Phosphate Polymer Ceramic for Bone Repair and Replacement – 45

Ambrozic, Vanja
Modulation in Stator Flux Control of Induction Motor for Reduced Torque Ripple – 77

Amemiya, N
Magnetization Losses in Multifilament Coated Superconductors (Postprint) – 280

Amsby, J.
Positionering av Radiosaendare i Svar Radionmiljoe (Radio DF in Difficult Environment) – 68

Anastasakos, Anastasios
Adaptation to New Microphones Using Tied-Mixture Normalization – 71

Anders, A.
Concept for Lightweight Spaced-Based Deposition Technology – 28

Anders, Scott
Parametric Evaluation of Thin, Transonic Circulation-Control Airfoils – 3

Anderson, B.
LLNL Heavy Element Facility-Facility Management, Authorization Basis, and Readiness Assessment Lessons Learned in the Heavy Element Facility (B251) Transition from Category II Nuclear Facility to Radiological Facility – 137

Anderson, Bernhard H.
Optimal Control of Shock Wave Turbulent Boundary Layer Interactions Using Micro-Array Actuation – 2

Anderson, J.
Lensing Signals in the Hubble Ultra-Deep Field Using All 2nd-Order Shape Deformations – 321

Andre, Elisabeth
Creating Interactive Virtual Humans: Some Assembly Required – 205

Andrew, Emily
Joint Synthetic Battlespace Desert Pivot Experiment (JDPE) – 211

Andrews, Dee H
R&D Advances in USAF Pilot Training – 9

Anheier, N. C.
FY 2005 Miniature Spherical Retroreflectors Final Report – 258

Anzlowar, M.
Electronic Device and Process for Forming Same – 90

Apps, J. A.
Review of Hazardous Chemical Species Associated with CO2 Capture from Coal-Fired Power Plants and their Potential Fate during CO2 Geologic Storage – 136

Arakawa, M
BSAR Computational Analysis and Proposed Mapping. Revision 1 – 238

Archbold, Armar A
A Team User's Guide – 314

Armstrong, Harry 0
Effects of Head Mounted Devices on Head-Neck Dynamic Response to +GZ Accelerations – 180

Armstrong, Robert C
Procedural Layout of a High-Speed Floating-Point Arithmetic Unit – 94

Armstrong, Tom
Design Considerations for the Second-Generation NPOI Fringe Tracker and Science Beam Combiner – 292

Arnold, David P.
MEMS Based Acoustic Array – 281

Arnoldsson, K. C.
Round Robin Testing Exercise on Method 8C of the STANAG 4360 – 59

Arnone, Robert
Sensor to User - NASA/EOS Data for Coastal Zone Management Applications Developed from Integrated Analyses: Verification, Validation and Benchmark Report – 125

Arzberger, Steven
Effect of Inclusion Morphology on the Coefficient of Thermal Expansion in Filled Epoxy Matrix (Preprint) – 47

Asaki, Thomas J
Characteristic Shape Sequences for Measures on Images – 252

Ashburn, Chris
Turbulence and Mountain Wave Conditions Observed with an Airborne 2-Micron Lidar – 19

Ashwood, J S
Implementation of the Asthma Practice Guideline in the Army Medical Department: Evaluation of Process and Effects – 161

Atencio, Adolph
Comanche Helmet-Mounted Display Heading-Tape Simulation – 20

Atwater, Harry A
E-MRS Spring Meeting - Nanophotonic Materials Session – 97

Atwood, D.
Spark Ignition Aircraft Engine Endurance Test of Aviation-Grade Ethanol 85 – 37

Aubert, B.
B Meson Decays to omega K*, omega p, omega omega, omega phi and omega F(sub o) – 273

Measurement of B Decays to PhiK-Gamma – 278

Measurements of the Decays B0-\gD0bar pp bar, B0-\gD*0pp bar, B0-\gD-pp bar/pi+, and B0-\gD*-pp bar/pi+ – 276

Aufderheide, M. B.
Phase Effects on Mesoscale Object X-ray Attenuation Radiographs – 259

Austin, S
Byblos Speech Recognition Benchmark Results – 226

Continuous Speech Recognition Using Segmental Neural Nets – 74

Improving State-of-the-Art Continuous Speech Recognition System Using the N-Best Paradigm with Neural Networks – 74

Axford, Jr, Roy A
Ultra Small Aperture Terminal (USAT) Phased Array Technology Demonstrator – 99

Ayala, Gustavo
The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer – 157

Ayers, Jeanine
STRATA: Observer-based Measurement Agent Research Support – 64

Babu, Sachi
MEMS Microshutter for James Webb Space Telescope – 318

Babuder, Maks
Importance of Cooling System Optimization with Regard to Lifetime and Reliability of Power Transformers – 76

Back, D. D.
Nanotube Composites and Methods for Producing – 46

Badavi, Francis F.
A Dynamic/Anisotropic Low Earth Orbit (LEO) Ionizing Radiation Model – 334

Bader, B. W.
Temporal Analysis of Social Networks Using Three-Way DEDICOM – 198

Badler, Norman
Creating Interactive Virtual Humans: Some Assembly Required – 205

Baer, M.
– 257

Bagayoko, Diola
Predictive Computations of Properties of Wide-Gap and Nano-Semiconductors – 100

Bagot, K.
Evaluation of a New Liquid Fire-Extinguishing Agent for Combustible Metal Fires – 42

Bahk, J-H
Solid-State and Vacuum Thermionic Energy Conversion – 134

Bai, Jing
Space Medicine and Medical Engineering, Volume 19, No. 5 – 174

Bai, Yan-qiang
Space Medicine and Medical Engineering, Volume 19, No. 5 – 174

Bailboni, John
Arcjet Semi-Elliptic Nozzle Simulations and Validation in Support of TPS Testing – 101

Bailey, J S
Aluminum Nitride Substrate Growth by Halide Vapor Transport Epitaxy – 53

Bajec, Marko
Semantic Web Rule Languages – 213

Bajikar, Sateesh
MEMS Microshutter for James Webb Space Telescope – 318

Baker, James
Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

Baker, Janet
Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

Balabdaoui, Fadoua
Using Bayesian Model Averaging to Calibrate Forecast Ensembles – 146

Balas, Benjamin J
Dissociated Dipoles: Image Representation via Non-local Comparisons – 255

Ballance, Judy L.
Electrodynamic Tether – 32

Baltz, E. A.
Luminosity Function of Faint Globular Clusters in M87 – 324

Bamberg, Paul
Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

Bamji, Cyrus S
Graph-based Representations and Coupled Verification of VLSI Schematics and Layouts – 95

Band, Joshua
Improving Human Interfaces in Military Simulation Applications – 210

Bane, K. L. F.
Wakefield Calculations for 3D Collimators – 295

Wakefields in the LCLS Undulator Transitions – 295

BAne, K.
SABER Optical Design – 264

Bankowski, Elena
A Comparison of the Detection Rates for Infrared and Visual Imagery of a Person Holdina an RPG – 109

Bao, Jun-xiang
Effects of Tail Suspension on Renin-angiotensin System in Rat Myocardium – 176

Baraate, R.
B Meson Decays to omega K*, omega p, omega omega, omega phi and omega F(sub o) – 273

Barate, R.
Measurement of B Decays to PhiK-Gamma – 278

Measurements of the Decays B0-\gD0bar pp bar, B0-\gD*0pp bar, B0-\gD-pp bar/pi+, and B0-\gD*-pp bar/pi+ – 276

Barbee, T.
MEMS Actuated Deformable Mirror – 259

Barber, T. L.
Plutonium-238 Alpha-Decay Damage Study of the Ceramic Waste Form – 58

Barhydt, Richard
Human Factors Considerations for Performance-Based Navigation – 5

Barlow, Gregory J
Design of Autonomous Navigation Controllers for Unmanned Aerial Vehicles Using Multi-Objective Genetic Programming – 18

Barnard, Stephen T
Stereo Matching by Hierarchical, Microcanonical Annealing – 249

Barnes, P N
Effect of O2 Partial Pressure on YBa2Cu3O7-delta Thin Film Growth by Pulsed Laser Deposition – 54

Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint) – 61

Magnetization Losses in Multifilament Coated Superconductors (Postprint) – 280

Barnett, J. M.
PNNL OS3700 Tritium Monitoring System Software and Hardware Operations Manual Rev. 0 – 197

Barnitt, R.
Case Study: Ebus Hybrid Electric Buses and Trolleys – 113

Barnkow, Steve
Energy Savings with a Scalable Source Capture Ventilation – 140

Baron, A.
Safety and Usability of Speech Interfaces for In-Vehicle Tasks while Driving: A Brief Literature Review – 184

Barrows, Danny A.
Method for Correcting Control Surface Angle Measurements in Single Viewpoint Photogrammetry – 12

Barry, C
Byblos Speech Recognition Benchmark Results – 226

Barry, Richard A
The Throughput of Wavelength Routing Networks – 83

Bartek, Louis
Use of Stochastic Modeling of Stratigraphic Relationships in High Resolution Seismic Reflection Data for Prediction of the Distribution of Acoustic and Geotechnical Property Variability in Near Surface Sediments on the East China Sea Continental Margin – 127

Barthelmy, S. D.
The Swift/BAT Hard X-ray Survey – 321

Bartlok, G.
New High Capacity Getter for Vacuum Insulated Mobile Liquid Hydrogen Storage Systems – 105

Barty, A.
Phase Effects on Mesoscale Object X-ray Attenuation Radiographs – 259

Baskin, Jack
Nanoscale Devices for Solid State Refrigeration and Power Generation – 133

Bastea, M.
Solid-Density Plasma Characterization with X-Ray Scattering on the 200-J Janus Laser – 271

Bathalon, Gaston
Weight Measurements and Standards for Soldiers – 165

Batygin, Y. K.
Spin Rotation and Energy Compression in the ILC Linac-to-Ring Beamline – 276

Baum, H. R.
Fire Dynamics Simulation (Version 2): Technical Reference Guide – 103

Baumann, Ethan
Tailored Excitation for Frequency Response Measurement Applied to the X-43A Flight Vehicle – 25

Baurle, R. A.
The Art of Extracting One-Dimensional Flow Properties from Multi-Dimensional Data Sets – 24

Baurle, Robert
Development of Supersonic Combustion Experiments for CFD Modeling – 105

Bayer, Samuel
Exploring Speech-Enabled Dialogue with the Galaxy Communicator Infrastructure – 217

Beamwsderfer, Michael
MEMS Microshutter for James Webb Space Telescope – 318

Beasley, D B
Dynamic IR Scene Projector Based Upon the Digital Micromirror Device – 74

Beckmann, V.
GRO J1655-40: Early Stages of the 2005 Outburst – 320

Beckner, Stanley G
Information Feasability: Using the Concept for Planning the Information Needs of Deploying Forces – 312

Bednarz, David
A Comparison of the Detection Rates for Infrared and Visual Imagery of a Person Holdina an RPG – 109

Beecher, Robert M
Mass Properties and Inertial Loading Effects of Head Encumbering Devices – 181

Beeson, Harold
Pressure Effects on Oxygen Concentration Flammability Thresholds of Materials for Aerospace Applications – 35

Beidleman, Beth A
Validation of a Shortened Electronic Version of the Environmental Symptoms Questionnaire – 160

Bej, Asim K.
Trichococcus Patagoniensis sp. nov., a Facultative Anaerobe that grows at -5 C, Isolated from Penguin Guano in Chilean Patagonia – 155

Bell, Anthony J
Analysis of fMRI Data by Blind Separation into Independent Spatial Components – 169

Bell, Haley P
Seismic Measurement of Concrete Strength Properties – 27

Bell, Herbert H
Evaluation of the Modular Semi-Automated Force Air Entity Simulation – 11

Bender, Matt
Dynamic IR Scene Projector Based Upon the Digital Micromirror Device – 74

Benelli, G.
New Developments in Measurements of CP Violation – 275

Benhaddou, D.
Sensor Networking Testbed with IEEE 1451 Compatibility and Network Performance Monitoring – 213

Bennett, John G
Algorithm for the Iterative Design of Observer Field Tests – 65

Techniques for Iterative Design of Observer Field Tests – 65

Techniques for the Statistical Analysis of Observer Data – 248

Bennett, L. M.
Report Back from the NCI-Wide Workshop: Enhancing Interactions to Reduce Cancer Health Disparities. Held on July 17th, 2006 – 306

Bennett, M.
Ionic Solvents Used in Ionic Polymer Transducers, Sensors and Actuators – 41

Benson, Bryan J
Transport Bombers: A Conceptual Shift in Precision-Guided Munitions Delivery – 16

Benson, K A
Toxicological Evaluation of Depleted Uranium in Rats: Six-Month Evaluation Point – 168

Benterou, J. L.
Method of Defining Features on Materials with a Femtosecond Laser – 288

Berg, L. K.
Analysis of Wintertime Winds in Washington, D.C – 141

Berger, K. T.
Fluorescence Visualization of Hypersonic Flow over Rapid Prototype Wind-Tunnel Models – 4

Berglund, Larry G
Forced Ventilation of Protective Garments for Hot Industries – 185

Transient Sweat Rate Calculation from Humidity Measurements Under Clothing – 297

Use of a Spacer Vest to Increase Evaporative Cooling Under Military Body Armor – 297

Berglund, Lary G
Clothing Ventilation Estimates From Manikin Measurements – 184

Bergren, A. J.
Electron Transfer Reactivity Patterns at Chemically Modified Electrodes: Fundamentals and Application to the Optimization of Redox Recycling Amplification Systems – 49

Bernacki, B. E.
FY 2005 Miniature Spherical Retroreflectors Final Report – 258

Berndt, Jon S.
Crew Exploration Vehicle Ascent Abort Coverage Analysis – 31

Bernhard, R.
STS-114 Micrometeoroid/Orbital Debris (MMOD) Post-Flight Assessment – 330

Berry, Pauline M
A Personalized Calendar Assistant – 311

Berry, Scott A.
Discrete Roughness Transition for Hypersonic Flight Vehicles – 3

Fluorescence Visualization of Hypersonic Flow Past Triangular and Rectangular Boundary-layer Trips – 4

Bertness, K. A.
Trends and Opportunities in Photonics Technologies: Solid-State Lighting and Healthcare – 87

Bertucci, C.
Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

Bester, Janez
Softswitch Architecture Remodelling for New Generation IP Multimedia Subsystem Environment – 79

Betemps, R.
SLS Optics Beamline – 265

Bethel, E. W.
HDF5-Fast Query: An API for Simplifying Access to Data Storage, Retrieval, Indexing and Querying – 302

High Performance Visualization using Query-Driven Visualization and Analytics – 188

Query-Driven Network Flow Data Analysis and Visualization. Final Report – 187

Bhatia, M
A Wavelet-Based Method for Multiscale Tomographic Reconstruction – 256

Bian, Z
Solid-State and Vacuum Thermionic Energy Conversion – 134

Bian, Zhixi
Cooling Enhancement Using Inhomogeneous Thermoelectric Materials – 298

Bing, Tao
Effects of Irradiation with Different Dose Rates of X-ray on Mouse Immune System – 177

Bingham, C.
Trough Receiver Heat Loss Testing – 129

Binns, W. R.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Biondini, G
Analysis of PMD Compensators With Fixed DGD Using Importance Sampling – 98

Birchenough, Arthur G.
Series Connected Buck-Boost Regulator – 87

Bird, R. Keith
Electron Beam Freeform Fabrication in the Space Environment – 319

Birkett, Nicholas
Dietary Heterocyclic Amines and Polymorphic Variants in the Etiology of Prostate Cancer – 159

Bishop, Kathleen
Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

Biswas, Rupak
HARP: A Fast Spectral Partitioner – 230

Bitteker, Leo
Radio-Frequency Driven Dielectric Heaters for Non-Nuclear Testing in Nuclear Core Development – 285

Bivolaru, Daniel
Development of Supersonic Combustion Experiments for CFD Modeling – 105

Bizjak, Grega
Analysis of Industrial Power Networks – 80

Power System Dynamic Security Assessment using Digital Simulation – 76

Bjoerk, Curt
Energy Savings Assessment Methodology - Cost Effective Ways of Establishing the Action Plan – 123

Blackshire, James L
Characterization and Modeling of Bonded Piezoelectric Sensor Performance and Durability in Simulated Aircraft Environments (Preprint) – 17

Blackwell, William C., Jr.
Radiation and Plasma Environments for Lunar Missions – 333

Blaisdell, G\g A.
Assessment of Turbulent Shock-Boundary Layer Interaction Computations Using the OVERFLOW Code – 101

Blake, David F.
Powder Handling Device for Analytical Instruments – 112

Blanchard, Laurie A
Transient Sweat Rate Calculation from Humidity Measurements Under Clothing – 297

Blanchat, T.
Validation Experiments to Determine Radiation Partitioning of Heat Flux to an Object in a Fully Turbulent Fire – 104

Blandford, Steve
Simulation Activities Using Gateway and Tactical Digital Information Links – 73

Blazic, Bostjan
Analysis of Flicker Levels in the Slovenian Transmission Network – 81

Blazic, Saso
Some Issues at Sampled-Data Identification and Conversion of the Identified Models into the Continuous-Time Domain – 75

Bliss, D F
Aluminum Nitride Substrate Growth by Halide Vapor Transport Epitaxy – 53

Blobaum, K. J. M.
Isothermal (Delta)/(Alpha-Prime) Transformation and TTT Diagram in a Plutonium Gallium Alloy – 38

Blodgett, David
The Effect of Hot Isostatic Pressing on the Optical Properties Of Spinel – 62

Blomquiest, R. N.
How Accurately Can We Calculate Neutrons Slowing Down in Water – 271

Bloomberg, J. J.
A Hypothetical Perspective on the Relative Contributions of Strategic and Adaptive Control Mechanisms in Plastic Recalibration of Locomotor Heading Direction – 155

Development of Training Programs to Optimize Planetary Ambulation – 179

Bloomberg, Jacob J.
Effects of Speed and Visual-Target Distance on Toe Trajectory During the Swing Phase of Treadmill Walking – 157

Locomotor Dysfunction after Spaceflight: Characterization and Countermeasure Development – 151

Blue, Thomas E.
Post Irradiation Evaluation of Thermal Control Coatings and Solid Lubricants to Support Fission Surface Power Systems – 114

Blumer, H.
SLS Optics Beamline – 265

Bobrow, R. J.
Motion-Based Visualization, Part One – 197

Motion-Based Visualization, Part Two – 196

Boettcher, Kevin L
Modeling the Interacting Decision Maker with Bounded Rationality – 251

On the Design of Information-Processing and Decisionmaking Organizations – 251

Bogard, Donald
Ar-39-Ar-40 Ages of Two Nakhlites, MIL03346 and Y000593: A Detailed Analysis – 327

Bogard, J. S.
Supplemental Release Limits for the Directed Reuse of Steel in Road Barriers and Lead in Shielding Products by the Department of Energy – 318

Bogomolov, V. V.
Organization, Management and Function of International Space Station (ISS) Multilateral Medical Operations – 180

Bogue, Rodney
Turbulence and Mountain Wave Conditions Observed with an Airborne 2-Micron Lidar – 19

Boldo, Sylvie
A High-Level Formalization of Floating-Point Number in PVS – 204

Boley, C.
Directed Energy System for Defeat of Improvised Explosive Devices and Landmines – 288

Bolivar, Alvaro
UMass at TREC 2002: Cross Language and Novelty Tracks – 228

Bollapragada, Rajesh
An Integrated Tool for High Speed Circuit Design Including Substrate Effects – 98

Bolles, R
Learning and Recognition in Natural Environments – 227

Bomba, M. S.
Evaluation and Integration of Texas Airports into the Trans-Texas Corridor, Project Summary – 8

Trans-Texas Corridor and the Texas Airport System: Opportunities and Challenges – 11

Bona, M.
B Meson Decays to omega K*, omega p, omega omega, omega phi and omega F(sub o) – 273

Measurement of B Decays to PhiK-Gamma – 278

Measurements of the Decays B0-\gD0bar pp bar, B0-\gD*0pp bar, B0-\gD-pp bar/pi+, and B0-\gD*-pp bar/pi+ – 276

Boone, Travis
Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics – 161

Borg, L. E.
Sm-Nd Isotopic Systematics of Troctolite 76335 – 330

Borg, Stephen E.
Fluorescence Visualization of Hypersonic Flow Past Triangular and Rectangular Boundary-layer Trips – 4

Borkar, Vivek S
Lattice Approximation in the Stochastic Quantization of (04)2 Fields – 237

Bormann, B. T.
Northwest Forest Plan-The First 10 Years (1994-2003): Synthesis of Monitoring and Research Results – 136

Bosetti, Cris
Progress in Flaps Down Flight Reynolds Number Testing Techniques at the NTF – 12

Bosted, P. E.
Factorization and Transverse Momentum in SIDIS at JLab – 277

Botkin, J.
Accelerating PV Cost Effectiveness Through Systems Design, Engineering, and Quality Assurance. Phase 1 Annual Technical Report, November 4, 2004-November 3, 2005 – 129

Botticello, J. E.
Trans-Texas Corridor and the Texas Airport System: Opportunities and Challenges – 11

Boufelfel, Ali
High Energy Density Polymer Film Capacitors – 96

Boulduc, C.
Tariff Analysis Project: A Database and Analysis Platform for Electrictiy Tariffs – 306

Boutigny, D.
B Meson Decays to omega K*, omega p, omega omega, omega phi and omega F(sub o) – 273

Measurement of B Decays to PhiK-Gamma – 278

Measurements of the Decays B0-\gD0bar pp bar, B0-\gD*0pp bar, B0-\gD-pp bar/pi+, and B0-\gD*-pp bar/pi+ – 276

Bowman, Cheryl L.
High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems – 57

Post Irradiation Evaluation of Thermal Control Coatings and Solid Lubricants to Support Fission Surface Power Systems – 114

Boyd, F E
A HF Pulsed Transmitter for an Experimental Cross-Correlation Radar System – 108

Boyle, Martin J
Foundations in the Law: Classic Cases in Medical Ethics – 159

Bozkurt, Gozde
Curve and Polygon Evolution Techniques for Image Processing – 199

Bozue, J
Fully Virulent Bacillus Anthracis Does Not Require the Immunodominant Protein BclA for Pathogenesis – 164

Braatz, R. D.
Methods for Controlling Dopant Concentration and Activation in Semiconductor Structers – 93

Brady, R.
Development of Training Programs to Optimize Planetary Ambulation – 179

Locomotor Dysfunction after Spaceflight: Characterization and Countermeasure Development – 151

Brady, Richard F
Dual Use of Commercial Avionics Data Links for the U.S. Air Force – 73

Brandenburg, R L
A Deception Repeater for Conical-Scan Automatic Tracking Radars – 108

Branicky, M S
A Hierarchical Algorithm for Neural Training and Control. Revision – 236

Branicky, Michael S
Analysis of Continuous Switching Systems: Theory and Examples – 254

Braswell, H. V.
Birds of a Feather: Supporting Secure Systems – 194

Bratina, Bozidar
On-Line Fault Detection and Isolation Using Analytical Redundancy – 80

Braude, Ilya
Hierarchical Role-based Viewing for Multi-level Information Security in Collaborative CAD – 307

Brazzel, Jack P.
NASA CEV On-Orbit GN&C Analysis – 35

Bregar, Zvonko
The Flores Mixed Integer Linear Programming Model for the Optimal Response of Hydro Cascades in the Electricity Spot Market – 81

Brent, Roger
Methods, Knowledge Support, and Experimental Tools for Modeling – 209

Brest, Janez
Statistical Alignment Models in Machine Translation from Slovenian to English – 186

Brinkley, James W
Minimizing the Sequenced Delay Time for Escape From High-Speed Low-Level Flight Profiles – 9

Britten, J. A.
Gratings for High Energy Petawatt Lasers – 279

Brocco, Lynne M
Macromodeling CMOS Circuits for Timing Simulation – 94

Brockmann, J. E.
Biological Restoration of Major Transportation Facilities Domestic Demonstration and Application Project (DDAP): Technology Develop(ment aat Sandia National Laboratories – 60

Brodsky, S. J.
New Perspectives for QCD From AdS/CFT – 259

Broocks, B. T.
FY 2005 Quantum Cascade Laser Alignment System. Final Report – 289

Broome, J.
NASA CEV Reference Entry GN&C System and Analysis – 21

Bross, A.
Muon Cooling RF R and D Program – 277

Brown, Don
Joint Synthetic Battlespace Desert Pivot Experiment (JDPE) – 211

Brown, E.
LLNL Heavy Element Facility-Facility Management, Authorization Basis, and Readiness Assessment Lessons Learned in the Heavy Element Facility (B251) Transition from Category II Nuclear Facility to Radiological Facility – 137

Brown, Greg G
Analysis of fMRI Data by Blind Separation into Independent Spatial Components – 169

Brown, W. D.
Analysis Procedures for Double-Shell Target Concentricity and Wall Thickness – 271

Browne, M.
Amplitude Linearizers for PEP-II 1.2 MW Klystrons and LLRF Systems – 294

Brungart, Douglas S
The Effect of Microphone Placement on Localization Accuracy with Electronic Pass-Through Earplugs – 284

Brunke, L
Effect of O2 Partial Pressure on YBa2Cu3O7-delta Thin Film Growth by Pulsed Laser Deposition – 54

Bruns, H. C.
Time-Resolved Soft X-Ray Imaging (SXRI) Diagnostic for Use at the NIF and OMEGA Lasers – 270

Bryant, Randal E
A Boolean Approach to Unbounded, Fully Symbolic Model Checking of Timed Automata – 257

Bryk, Darryl
A Comparison of the Detection Rates for Infrared and Visual Imagery of a Person Holdina an RPG – 109

Bubenheim, David L.
Application of NASA's Advanced Life Support Technologies in Polar Regions – 148

Bucholtz, F
Intensity Analysis of Recurrence Plots for the Detection of Deterministic Signals in Noise – 246

Buchta, W. M.
Reactive Materials and Thermal Spray Methods of Making Same – 56

Buck, G. M.
Fluorescence Visualization of Hypersonic Flow over Rapid Prototype Wind-Tunnel Models – 4

Buckwalter, J G
Human Emotional State and its Relevance for Military VR Training – 202

Bukowski, R. W.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design, Construction, and Maintenance of Structural and Life Safety Systems. NIST NCSTAR 1-1 – 299

Bullen, Thomas
Natural Calcium Isotopic Composition of Urine as a Marker of Bone Mineral Balance – 155

Bumgarner, Roger E
Robust Estimation of cDNA Microarray Intensities with Replicates – 245

Bunce, G.
Parton Orbital Angular Momentum – 262

Burger, M. H.
Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

Burke, Laura M.
Crew Exploration Vehicle Ascent Abort Coverage Analysis – 31

Burkert, V. D.
Nucleon resonance studies in phenomenological analysis of the CLAS data on double charged pion photo and electroproduction – 268

Burkholder, R. J.
EM Threat Analysis for Wireless Systems – 71

Hardware-in-the-Loop Testing of Wireless Systems in Realistic Environments – 70

Burlaga, Leonard
Trains of Magnetic Holes and Magnetic Humps in the Heliosheath – 325

Burner, Alpheus W.
Method for Correcting Control Surface Angle Measurements in Single Viewpoint Photogrammetry – 12

Burnett, D. S.
Decontamination of Genesis Array Materials by UV Ozone Cleaning – 329

Burton, Amy R
Foundations in the Law: Classic Cases in Medical Ethics – 159

Burton, L.
Gallium Nitride Crystals and Wafers and Method of Making – 264

Cabell, K. F.
Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel – 26

Calaway, M. J.
Genesis Silicon Carbide Concentrator Target 60003 Preliminary Ellipsometry Mapping Results – 329

Calaway, Michael J.
Decontamination of Genesis Array Materials by UV Ozone Cleaning – 329

Caldwell, T.
Global, Multi-Year Analysis of Clouds and Earth's Radiant Energy System Terra Observations and Radiative Transfer Calculations – 142

Camanho, Pedro P.
Simulation of Delamination Propagation in Composites Under High-Cycle Fatigue by Means of Cohesive-Zone Models – 122

Campbell, B. R.
Investigation of Temporal Contrast Effects in Femtosecond Pulse Laser Micromachining of Metals – 291

Campbell, Charles H.
Orbiter Gap Filler Bending Model for Reentry – 33

Campbell, Daniel P
Standardization of Object Oriented Extensions to Vector Signal and Image Processing Library (VSIPL) – 209

Campbell, S.
High Performance Visualization using Query-Driven Visualization and Analytics – 188

Campisi, I.
SNS Cryogenic Systems Commissioning – 295

Cannon, B. D.
FY 2005 Quantum Cascade Laser Alignment System. Final Report – 289

Cao, J
A Multi-Scale Modeling of Laser Cladding Process (Preprint) – 112

Capozza, P T
Measured Effects of a Narrowband Interference Suppressor on GPS Receivers – 99

Carbajo, J. J.
Technology Development Program for an Advanced Potassium Rankine Power Conversion System Compatible with Several Space Reactor Designs – 27

Carciofini, J. C.
Communications System Based on Real-Time Neurophysiological Characterization – 70

Cardimona, David
Template-Growth of Highly Ordered Carbon Nanotube Arrays on Silicon POSTPRINT – 53

Cardman, L. S.
Physics at the Thomas Jefferson National Accelerator Facility – 280

Carino, N. J.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design, Construction, and Maintenance of Structural and Life Safety Systems. NIST NCSTAR 1-1 – 299

Carley, Kathleen M
A Network Optimization Approach for Improving Organizational Design – 247

CORES - Complex Organizational Reasoning System – 216

ORA: Organization Risk Analyzer – 210

Response Surface Methodology – 232

Carlson, Lynn
Tasks, Domains, and Languages – 308

Carlson, T. C.
Gratings for High Energy Petawatt Lasers – 279

Carpenter, Kenneth
Direct Imaging of Stellar Surfaces: Results from the Stellar Imager (SI) Vision Mission Study – 325

Carpenter, Paul
Building Robust Planning and Execution Systems for Virtual Worlds – 203

Carr, C. W.
Multi Dimensional Investigation of Laser Conditioning in KDP and DKDP Crystals – 290

Summary of Recent Damage-Initiation Experiments on KDP Crystals – 291

Carrell, D. D.
PNNL OS3700 Tritium Monitoring System Software and Hardware Operations Manual Rev. 0 – 197

Carrell, D. M.
PNNL OS3700 Tritium Monitoring System Software and Hardware Operations Manual Rev. 0 – 197

Carrington, R. A.
Structures Including Network and Topology for Identifying, Locating and Quantifying Physical Phenomena – 39

Carroll, Lynn A
R&D Advances in USAF Pilot Training – 9

Carruthers, Thomas F
Dispersion Management in a Harmonically Mode-Locked Fiber Soliton Laser – 111

Carter, E
Virtual Design and Testing of Materials: A Multiscale Approach – 40

Carter, R
Heat Related Illnesses – 179

Casagrande, F.
SNS Cryogenic Systems Commissioning – 295

Casillas, Robert P
A Medical Research and Evaluation Facility (MREF) and Studies Supporting the Medical Chemical Defense Program – 167

Cassell, Justine
Creating Interactive Virtual Humans: Some Assembly Required – 205

Castro, Patricia
The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer – 157

Castrucci, F.
Organization, Management and Function of International Space Station (ISS) Multilateral Medical Operations – 180

Cavalieri, Ercole L
Estrogen-Induced Depurination of DNA: A Novel Target for Breast Cancer Prevention – 173

Cedar, G
Virtual Design and Testing of Materials: A Multiscale Approach – 40

Celeste, J. R.
Time-Resolved Soft X-Ray Imaging (SXRI) Diagnostic for Use at the NIF and OMEGA Lasers – 270

Cera, Christopher D
Hierarchical Role-based Viewing for Multi-level Information Security in Collaborative CAD – 307

Chabot, Donald J
Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 164

Chackerian, C.
Zeeman Tuning Rates in the v3 Band of NO2 – 110

Chakrabarti, Deepayan
Fully Automatic Cross-Associations – 302

Chakraborty, Arup K
Simulation of Biomolecular Nanomechanical Systems – 160

Chambliss Joe
Exploration Life Support Technology Development Challenges – 327

Chamis, Christos C.
Probabilistic Design of Composite Structures – 45

Chan, Kwing L.
Modeling the Observed Solar Cycle Variations of the Quasi-biennial Oscillation (QBO): Amplification by Wave Forcing – 144

Chan, S. T.
Study of Stability Conditions in an Urban Area – 139

Chang, Chein-Chi
New Hyperspectral Discrimination Measure for Spectral Characterization – 228

Chang, Chein-I
Chemical Vapor Detection with a Multispectral Thermal Imager – 109

New Hyperspectral Discrimination Measure for Spectral Characterization – 228

Target Detection in Multispectral Images using the Spectral Co-Occurrence Matrix and Entropy Thresholding – 284

Chang, H. P.
Vertical Beam Size Control in TLS and TPS – 275

Chapman, K. S.
Cost-Effective Reciprocating Engine Emissions Control and Monitoring for E&P Field and Gatherings Engines. Report 14. Technical Report, April 1, 2006-June 30, 2006 – 114

Charlock, T. P.
Global, Multi-Year Analysis of Clouds and Earth's Radiant Energy System Terra Observations and Radiative Transfer Calculations – 142

Charlock, Thomas P.
Validation of the Archived CERES Surface and Atmosphere Radiation Budget (SARB) at SGP – 142

Chellapilla, S
Computational Design of UHTC Materials for Hypersonic Applications (Preprint) – 61

Chen, C. H.
High Sensitivity Array-Based Detection System – 94

Chen, Dechang
Software Tool for Analysis of Variance of DNA Microarray Data – 163

Chen, J. R.
Vertical Beam Size Control in TLS and TPS – 275

Chen, J.
Efficient Subtorus Processor Allocation in a Multi-Dimensional Torus – 197

Chen, Shan-guang
Space Medicine and Medical Engineering, Volume 19, No. 5 – 174

Chen, Shou-ping
Research of Biomechanical Evaluation Methods of Hand Performance Fatigue – 178

Chen, T R
Performance Improvement in Quantum Well Lasers by Optimizing Band Gap Offset at Quantum Well Heterojunctions – 111

Sub-100 muA Current Operation of Strained InGaAs Quantum Well Lasers at Low TemperaturesL – 111

Chen, Tony
Incorporation of Half-Cycle Theory Into Ko Aging Theory for Aerostructural Flight-Life Predictions – 121

Cheruvu, S.
Combustion Turbine (CT) Hot Section Coating Life Management. (Final Report) – 60

Cheuvront, S N
Heat Related Illnesses – 179

Chhabildas, L.
Survey of the Hypervelocity Impact Technology and Applications – 28

Choi, Benjamin B.
A Bearingless Switched-Reluctance Motor for High Specific Power Applications – 23

Choi, J. D.
Characterization of Materials with Optically Shaped Acoustic Waveforms – 272

Choi, J
A Multi-Scale Modeling of Laser Cladding Process (Preprint) – 112

Choi, S.
In-vivo Imaging of the Photoreceptor Mosaic in Retinal Dystrophies and Correlation with Visual Function – 290

Chou, P. J.
Vertical Beam Size Control in TLS and TPS – 275

Christian, E. R.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Christiansen, E.
STS-114 Micrometeoroid/Orbital Debris (MMOD) Post-Flight Assessment – 330

Chu, Lisa W
Dietary Determinants of Prostate Cancer – 170

Chuang, W. Y.
Topological Twisted Sigma Model with H-Flux Revisited – 267

Chun, W. S.
Architecture for Rendering Graphics on Output Devices Over Diverse Connections – 305

Chung, G. Y.
Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

Chung, Peter W
Numerical Methods for Analysis of Charged Vacancy Diffusion in Dielectric Solids – 95

Chung, Soon M
Specification for Visual Requirements of Work-Centered Software Systems – 211

Chupp, Raymond E.
Turbomachinery Clearance Control – 115

Cinotti, L.
LFR Lead Cooled Fast Ractor – 270

Ciovati, G.
Investigation of Hot-Spots as a Function of Material Removal in a Large-Grain Niobium Cavity – 258

JLAB Ampere-Clast Cryomodule Conceptual Design – 260

Performances of High Purity Niobium Cavities with Different Grain Sizes – 258

Recent Developments in SRF Cavity Science and Performance – 273

Claesson, O.
Round Robin Testing Exercise on Method 8C of the STANAG 4360 – 59

Clayton, John D
Numerical Methods for Analysis of Charged Vacancy Diffusion in Dielectric Solids – 95

Coates, A. J.
Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

Coble, Jeffrey A
Iterative Structure Discovery in Graph-Based Data – 249

Coderc, F.
Measurements of the Decays B0-\gD0bar pp bar, B0-\gD*0pp bar, B0-\gD-pp bar/pi+, and B0-\gD*-pp bar/pi+ – 276

Cohen, Charles
Improving Human Interfaces in Military Simulation Applications – 210

Cohen, H. S.
Development of Training Programs to Optimize Planetary Ambulation – 179

Locomotor Dysfunction after Spaceflight: Characterization and Countermeasure Development – 151

Cohen, R. H.
New Simulation Capabilities of Electron Clouds in Ion Beams with Large Tune Depression – 279

Cohn, M.
MEMS Actuated Deformable Mirror – 259

Cokus, M
XML-Native Constraint Evaluation – 253

Coleman, J.
Bunch Length Measurements at the JLab FEL Using Coherent Transition and Synchrotron Radiation – 294

Coleman, L. H.
Global, Multi-Year Analysis of Clouds and Earth's Radiant Energy System Terra Observations and Radiative Transfer Calculations – 142

Coleman, R. L.
Supplemental Release Limits for the Directed Reuse of Steel in Road Barriers and Lead in Shielding Products by the Department of Energy – 318

Collins, William E
A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series – 10

Index to FAA Office of Aerospace Medicine Reports: 1961 through 2004 – 17

Comfort, Allen
An Introduction to Heavy-Duty Diesel Engine Frictional Losses and Lubricant Properties Affecting Fuel Economy - Part 1 – 65

Comtois, J. M.
Organization, Management and Function of International Space Station (ISS) Multilateral Medical Operations – 180

Condon, Nancy K
Study of Attrition Documentation at the U.S. Navy Recruit Training Command – 310

Congiardo, Jared F.
Modeling and Analysis of Facility Systems for A Hybrid Materials Test Program – 62

Congiardo, Jared
Overview of Engineering Design and Analysis at the NASA John C. Stennis Space Center – 22

Connell, Margaret E
UMass at TREC 2002: Cross Language and Novelty Tracks – 228

Conquest, Michael T
Evaluation of the Modular Semi-Automated Force Air Entity Simulation – 11

Constant, A. P.
Ultra-Hard Low Friction Coating Based on ALMGB14 for Reduced Wear on MEMS and Other Tribiological Components and System – 59

Conte de Leon, Daniel
Implementation-Oriented Secure Architectures – 214

Cook, B. A.
Ultra-Hard Low Friction Coating Based on ALMGB14 for Reduced Wear on MEMS and Other Tribiological Components and System – 59

Cook, Diane J
Iterative Structure Discovery in Graph-Based Data – 249

Subdue: Compression-Based Frequent Pattern Discovery in Graph Data – 302

Cook, L P
Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint) – 61

Coon, Edith-Dawnn
Analyzing the Structure of Air Force Space Acquisitions – 29

Cooney, Adam
Characterization and Modeling of Bonded Piezoelectric Sensor Performance and Durability in Simulated Aircraft Environments (Preprint) – 17

COoper, J. F.
Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

Cooper, J. F.
Titan Orbiter with Aerorover Mission (TOAM) – 319

Cooperman, C. B.
Step Current Inductive Antenna for Pulse Inductive Metal Detector – 91

Core, Mark G
Building Explainable Artificial Intelligence Systems – 223

Explainable Artificial Intelligence for Training and Tutoring – 220

Core, Mark
Reflective Tutoring for Immersive Simulation – 220

Corrada-Emmanuel, Andres
UMass at TREC 2003: HARD and QA – 312

Corral, E.
Ultra High Temperature Ceramics for Hypersonic Vehicle Applications – 58

Costa, Josep
Simulation of Delamination Propagation in Composites Under High-Cycle Fatigue by Means of Cohesive-Zone Models – 122

Costello, R
XML-Native Constraint Evaluation – 253

Cote, C K
Fully Virulent Bacillus Anthracis Does Not Require the Immunodominant Protein BclA for Pathogenesis – 164

Couderc, F.
Measurement of B Decays to PhiK-Gamma – 278

Couderc, R.
B Meson Decays to omega K*, omega p, omega omega, omega phi and omega F(sub o) – 273

Coughlin, K.
Tariff Analysis Project: A Database and Analysis Platform for Electrictiy Tariffs – 306

Courcelle, A.
Neutron Resonance Parameters of 238U and the Calculated Cross Sections from the Reich-Moore Analysis of Experimental Data in the Neutron Enrgy Range from O keV to 20 keV – 293

Cowburn, David
Rational Design of Regulators of Programmed Cell Death in Human Breast Cancer – 163

Coxson, Pamela G
Conditions for Scale-Based Decompositions in Singularly Perturbed Systems – 240

Coyle, Katy
National Register Assessment of the Broadmoor Neighborhood, New Orleans, Orleans Parish, Louisiana – 122

Cramer, Michael J
Using Computer Games to Train Information Warfare Teams – 208

Crane, J. L.
CETIS: Complex Effluents Toxicity Information System. CETIS Retrieval System User's Manual – 306

Crane, Tim
NASA CEV On-Orbit GN&C Analysis – 35

Crawford, Bradley L.
Angle Measurement System (AMS) for Establishing Model Pitch and Roll Zero, and Performing Single Axis Angle Comparisons – 24

Crawford, Larry
Developing an Inflatable Solar Array – 31

Creaser, J.
Communications System Based on Real-Time Neurophysiological Characterization – 70

Cretin, Shan
Implementation of the Asthma Practice Guideline in the Army Medical Department: Evaluation of Process and Effects – 161

Crocker, Lori
Effective Teamwork: The EVA NBL Experience – 299

Crocker, R.
Polymerization Welding and Application to Microfluidics – 60

Croft, W B
UMass at TREC 2004: Novelty and HARD – 310

Cronin, John
Effect of Inclusion Morphology on the Coefficient of Thermal Expansion in Filled Epoxy Matrix (Preprint) – 47

Croop, Harold
Materials Development for Hypersonic Flight Vehicles – 45

Crosby, Jay
Dynamic IR Scene Projector Based Upon the Digital Micromirror Device – 74

Crouch, Richard
Speed and Accuracy in Shallow and Deep Stochastic Parsing – 241

Crull, Timothy
Numerical Skip-Entry Guidance – 32

Cucinotta, Francis A.
Evaluating Shielding Effectiveness for Reducing Space Radiation Cancer Risks – 334

Cullen, D. E.
How Accurately Can We Calculate Neutrons Slowing Down in Water – 271

Cumings, R G
A HF Pulsed Transmitter for an Experimental Cross-Correlation Radar System – 108

Cumings, Richard G
Application of Tactitron RCA Type 6441 to Pulse Circuitry – 97

Cummings, A. C.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Curl, Gregory A
The Development of a Logistical Body of Knowledge for the Department of Defense – 313

Curtin, W A
Virtual Design and Testing of Materials: A Multiscale Approach – 40

Curtis, J. E.
Apparatus for Using Optical Tweezers to Manipulate Materials – 288

Cutler, Andrew D.
Development of Supersonic Combustion Experiments for CFD Modeling – 105

Cymerman, Allen
Validation of a Shortened Electronic Version of the Environmental Symptoms Questionnaire – 160

Dahleh, Munther A
Robust Controller Design: Minimizing Peak-to-Peak Gain – 252

Dailey, D. J.
Use of Weather Data to Predict Non-Recurring Traffic Congestion – 142

Daly, E. F.
JLAB Ampere-Clast Cryomodule Conceptual Design – 260

Daly, P
Project Clinker, Hydraulic Carriage for Airship Installation of Optical Equipment – 16

Damianos, Laurie
MiTAP for Bio-Security: A Case Study – 311

MiTPA for Real Users, Real Data, Real Problems – 307

D'Amico, Francis M
New Hyperspectral Discrimination Measure for Spectral Characterization – 228

Danehy, P. M.
Fluorescence Visualization of Hypersonic Flow over Rapid Prototype Wind-Tunnel Models – 4

Danehy, Paul M.
Development of Supersonic Combustion Experiments for CFD Modeling – 105

Dang, Bing-rong
Effects of Irradiation with Different Dose Rates of X-ray on Mouse Immune System – 177

Dart, E.
High Performance Visualization using Query-Driven Visualization and Analytics – 188

Darter, M. I.
Advanced Quality Systems: Guidelines for Establishing and Maintaining Construction Quality Databases – 303

Dautricourt, Matthieu
A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Davila, Carlos G.
Simulation of Delamination Propagation in Composites Under High-Cycle Fatigue by Means of Cohesive-Zone Models – 122

Davis, A. J.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Davis, K.
High Gradient Operation with the CEBAF Upgrade RF Control System – 268

Davis, M. R.
Metamaterial Scanning Lens Antenna Systems and Methods – 70

Davis, P. F.
High Magnetic Field Generation for Laser-Plasma Experiments – 270

Davis, Robert J
Multipath Mitigation Performance of Planar GPS Adaptive Antenna Arrays for Precision Landing Ground Stations – 95

Dawson, L. R.
Semiconductor Conductive Layers – 89

Day, David
MiTAP for Bio-Security: A Case Study – 311

Day, William A
Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 164

de la Rue du Can, S.
Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions – 143

De Ventra, M.
Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

Debevec, Paul
Acquisition of Time-Varying Participating Media – 107

DebRoy, T.
In-Situ Observation of Phase Transformations During Welding of 1045 Steel Using Spatially Resolved and Time Resolved X-Ray Diffraction – 56

Dec, John A.
Autonomous Aerobraking Using Thermal Response Surface Analysis – 34

Probabilistic Thermal Analysis During Mars Reconnaissance Orbiter Aerobraking – 105

Deegan, Patrick
Designing a Self-Stabilizing Robot for Dynamic Mobile Manipulation – 225

Del Rose, Michael
A Support Vector Machine Application on Vehicles – 107

DeMange, P.
Different Precursor Populations Revealed by Microsciouc Studies of Bulk Damage in KDP and DKDP Crystals – 43

Multi Dimensional Investigation of Laser Conditioning in KDP and DKDP Crystals – 290

DeMenthon, Daniel
Video Summarization by Curve Simplification – 234

Demos, S. G.
Different Precursor Populations Revealed by Microsciouc Studies of Bulk Damage in KDP and DKDP Crystals – 43

Multi Dimensional Investigation of Laser Conditioning in KDP and DKDP Crystals – 290

Demsar, Janez
Statistical Comparisons of Classifiers in Machine Learning – 79

Deng, Xiaomin
Crack Growth and Stress Intensity Prediction Techniques. Delivery Order 0027-1: Mixed Mode Failure Criteria – 281

Denholm, P.
Evaluation of Utility System Impacts and Benefits of Optimally Dispatched Plug-In Hybrid Electric Vehicles – 82

Dennis, J E
Characteristic Shape Sequences for Measures on Images – 252

deNolfo, G. A.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Dentinger, P. M.
Polymerization Welding and Application to Microfluidics – 60

Derecho, A. T.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. NIST NCSTAR 1-1A. (Appendices not included) – 300

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Maintenance and Modifications to Structural Systems. NIST NCSTAR 1-1C. (Appendices not included) – 117

Derrien, H.
Neutron Resonance Parameters of 238U and the Calculated Cross Sections from the Reich-Moore Analysis of Experimental Data in the Neutron Enrgy Range from O keV to 20 keV – 293

Deuel, Thomas F
Novel Angiogenic Domains: Use in Identifying Unique Transforming and Tumor Promoting Pathways in Human Breast Cancer – 162

D'Evelyn, M. P.
Gallium Nitride Crystals and Wafers and Method of Making – 264

DeVore, Jeffrey W
Reverse Logistics: Has the Implementation of Reverse Logistics Met the Objectives of Air Mobility Command – 210

Diaz, Fernando
UMass at TREC 2004: Novelty and HARD – 310

Dibert, John C
An Analysis of Earned Value Management Implementation Within the F-22 System Program Office's Software Development – 19

DiCarlo, James
Selectivity of Local Field Potentials in Macaque Inferior Temporal Cortex – 226

DiCesare, Deborah
Live Modeling of a Dyna Vision SPR-02 Sensor for Rangefinding Application – 110

Dickey, Claudia
Defense Infrastructure: Continuing Challenges in Managing DOD Lodging Programs as Army Moves to Privatize Its Program – 122

Diedrich, Frederick
STRATA: Observer-based Measurement Agent Research Support – 64

Diefenbach, Michael A
Facilitating Treatment Decision Making, Adjustment, and Coping in Men Newly Diagnosed with Prostate Cancer. Addendum – 164

Diekmann, Anne M.
Radiation and Plasma Environments for Lunar Missions – 333

Digalakis, V
Fast Search Algorithms for Connected Phone Recognition Using the Stochastic Segment Model – 235

Digel, S. W.
Inverse Compton Scattering on Solar Photons, Heliospheric Modulation, and Neutrino Astrophysics – 322

Ding, C.
Concurrent Single-Executable CCSM with MPH Library – 196

Ding, Li
Research of Biomechanical Evaluation Methods of Hand Performance Fatigue – 178

Dini, Don M
Building Robust Planning and Execution Systems for Virtual Worlds – 203

Dini, Don
Mixing Story and Simulation in Interactive Narrative – 203

Dirling, Ray
Materials Development for Hypersonic Flight Vehicles – 45

Dissinger, Bryan M
Intensity Analysis of Recurrence Plots for the Detection of Deterministic Signals in Noise – 246

Diwan, M.
Proposal for an Experimental Program in Neutrino Physics and Proton Decay in the Homestake Laboratory – 274

Dixon, Matthew
The Maintenance Costs of Aging Aircraft: Insights from Commercial Aviation – 27

Doarn, Charles R
Conference Support - Surgery in Extreme Environments - Center for Surgical Innovation – 29

Doble, N.
In-vivo Imaging of the Photoreceptor Mosaic in Retinal Dystrophies and Correlation with Visual Function – 290

Dodd, R B
Coloured Petri Net Modelling of a Generic Avionics Mission Computer – 200

Doermann, David
Video Summarization by Curve Simplification – 234

Domin, D.
Graphene Layer Growth: Collision of Migrating Five-Member Rings – 52

Dong, H.
Commissioning of the Digital LLRF for CEBAF Injector/Separator – 269

High Gradient Operation with the CEBAF Upgrade RF Control System – 268

Doran, Christine
Exploring Speech-Enabled Dialogue with the Galaxy Communicator Infrastructure – 217

Dorneich, M. C.
Communications System Based on Real-Time Neurophysiological Characterization – 70

Dorr, Bonnie
Summarization-Inspired Temporal-Relation Extraction: Tense-Pair Templates and Treebank-3 Analysis – 253

Dougal, Roger A
Soldier System Power Sources – 131

Dowd, P.
Semiconductor Conductive Layers – 89

Dowell, D. H.
Comparison Between H-Ion and Heat Cleaning of CU-Metal Cathodes – 269

Dowell, Susan R.
Comanche Helmet-Mounted Display Symbology Simulation – 20

Dowell, Susan
Comanche Helmet-Mounted Display Heading-Tape Simulation – 20

Dozois, Aimee
Development of a Data Management Tool for Investigating Multivariate Space and Free Will Experiences in Virtual Reality – 201

The Fidelity of 'Feel': Emotional Affordance in Virtual Environments – 203

Draper, Mark
Two Chapters of Technical Report: Unmanned Military Vehicles - Human Factors of Augmenting the Force Chapter 1: Introduction Chapter 8: Summary: Issues and Conclusions – 185

Drawer, Gordon
ESPC Issues: DOE Super Energy Savings Performance Contracts – 134

Driscoll, J. L.
Enhanced Pinning in YBCO Films with Bazro3 Nanoparticles – 293

Drumm, A.
Collision Avoidance for Unmanned Aircraft: Proving the Safety Case – 6

Drummond, Sean P
PR01 - The Effects of Total Sleep Deprivation and Recovery Sleep on Cognitive Performance and Brain Function – 181

DSouza, Chris
NASA CEV On-Orbit GN&C Analysis – 35

Du, Yingzi
New Hyperspectral Discrimination Measure for Spectral Characterization – 228

Duchsherer, D. J.
PNNL OS3700 Tritium Monitoring System Software and Hardware Operations Manual Rev. 0 – 197

Dufresne, E. R.
Apparatus for Using Optical Tweezers to Manipulate Materials – 288

Dulchinos, VIcki
Operational Interventions to Maintenance Error – 5

Duling, III, Irl N
Dispersion Management in a Harmonically Mode-Locked Fiber Soliton Laser – 111

Dumm, H. P.
Ultra High Temperature Ceramics for Hypersonic Vehicle Applications – 58

Dumont, C. J.
Investigations of Performance of Pneumatic Deicing Boots, Surface Ice Detectors, and Scaling of Intercycle Ice – 2

Duncan, Donald
The Effect of Hot Isostatic Pressing on the Optical Properties Of Spinel – 62

Duncan, James M.
Organization, Management and Function of International Space Station (ISS) Multilateral Medical Operations – 180

Dunn, M. E.
Proceedings of the Oak Ridge Electron Linear Accelerator (ORELA) Workshop – 323

Dyakonov, Artem A.
Fluorescence Visualization of Hypersonic Flow Past Triangular and Rectangular Boundary-layer Trips – 4

Eades, Cynthia S
The Effect of Microphone Placement on Localization Accuracy with Electronic Pass-Through Earplugs – 284

Eastman, Joseph L.
An Integrated High Resolution Hydrometeorological Modeling Testbed using LIS and WRF – 144

Eckenrode, John E
Study of Attrition Documentation at the U.S. Navy Recruit Training Command – 310

Edmunson, J.
Sm-Nd Isotopic Systematics of Troctolite 76335 – 330

Edwards, David L.
Radiation and Plasma Environments for Lunar Missions – 333

Edwards, Dean B
Crawler Control Strategies and Their Influence on Mine Finding Capabilities – 222

Edwards, G. A.
Structure and Function Evolution of Thiolate Monolayers on Gold – 48

Eggleton, P. P.
Evolution of Intermediate and Low Mass Binary Systems – 332

Ehernberger, Jack
Turbulence and Mountain Wave Conditions Observed with an Airborne 2-Micron Lidar – 19

Einarsson, Per
Acquisition of Time-Varying Participating Media – 107

El-Dasher, B. S.
Effect of Solution Annealing on Alloy 22 Weld Properties – 54

Elliott, T.
JLAB Ampere-Clast Cryomodule Conceptual Design – 260

Ellis, David L.
Development of GRCop-84 for Rocket Engine Applications – 56

Elmer, J.
In-Situ Observation of Phase Transformations During Welding of 1045 Steel Using Spatially Resolved and Time Resolved X-Ray Diffraction – 56

Elmiligui, Alaa
Three-Dimensional Computational Model for Flow in an Over-Expanded Nozzle With Porous Surfaces – 1

Elmore, Lynne W
Molecular Mechanisms of Prostate Cancer Progression – 171

Emma, P.
SABER Optical Design – 264

Emond, Mary J
Easy Computation of Bayes Factors and Normalizing Constants for Mixture Models via Mixture Importance Sampling – 245

Endrusick, Thomas L
Use of a Spacer Vest to Increase Evaporative Cooling Under Military Body Armor – 297

Endrusick, Tom L
Forced Ventilation of Protective Garments for Hot Industries – 185

Eng, L E
Sub-100 muA Current Operation of Strained InGaAs Quantum Well Lasers at Low TemperaturesL – 111

Erdem, Halime
The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer – 157

Erickson, Mark
Into the Unknown Together. The DOD, NASA, and Early Spaceflight – 31

Erickson, R.
SABER Optical Design – 264

Eriksson, L.
Pressure Model for the Vacuum System for the Electron Gun and Injector for LCLS Final Design Report – 271

Esh, D. G.
Plutonium-238 Alpha-Decay Damage Study of the Ceramic Waste Form – 58

Espenak, Fred
Five Millennium Canon of Solar Eclipses: -1999 to +3000 (2000 BCE to 3000 CE) – 319

Esper, J.
Titan Orbiter with Aerorover Mission (TOAM) – 319

Evans, D. D.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Fires Prior to September 11, 2001. NIST NCSTAR 1-4A – 119

Evans, J M
Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint) – 61

Evtushenko, P.
Bunch Length Measurements at the JLab FEL Using Coherent Transition and Synchrotron Radiation – 294

Ewin, Audrey
MEMS Microshutter for James Webb Space Telescope – 318

Ezzat, Tony
Perceptual Evaluation of Video-Realistic Speech – 71

Fabloutsos, Christos
Fully Automatic Cross-Associations – 302

Fabrega, F J
Authentication Tests and the Structure of Bundles – 229

Fagnani, Fabio
An Operator-Theoretic Approach to the Mixed-Sensitivity Minimization Problem – 236

Fahy, R. F.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Analysis of Published Accounts of the World Trade Center Evacuation. NIST NCSTAR 1-7A – 120

Fairbrother, D.
Titan Orbiter with Aerorover Mission (TOAM) – 319

Falck, Robert D.
Crew Exploration Vehicle Ascent Abort Coverage Analysis – 31

Falcone, A.
The Swift/BAT Hard X-ray Survey – 321

Faloutsos, Christos
Tri-Plots: Scalable Tools for Multidimensional Data Mining – 308

Fan, Xiao-li
Prophylactic Effects of Choline Chloride on Muscle Atrophy in Tail-suspended Rats – 177

Fanella, D. A.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. NIST NCSTAR 1-1A. (Appendices not included) – 300

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Maintenance and Modifications to Structural Systems. NIST NCSTAR 1-1C. (Appendices not included) – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety, and Structural Systems of World Trade Center 7. NIST NCSTAR 1-1I – 120

Fang, Zu-xiang
Fitting APD Restitution with Artificial Neural Network – 174

Farkas, D
Virtual Design and Testing of Materials: A Multiscale Approach – 40

Farley, Donna O
Implementation of the Asthma Practice Guideline in the Army Medical Department: Evaluation of Process and Effects – 161

Farley, R.
Titan Orbiter with Aerorover Mission (TOAM) – 319

Farquar, H. D.
High Sensitivity Array-Based Detection System – 94

Farquhar, John T
A Need to Know: The Role of Air Force Reconnaissance in War Planning, 1945-1953 – 16

Fasenfest, B. J.
Parallel Computer Implementation of Fast Low-Rank QR Approximation of the Biot-Savart Law – 188

Fazio, C.
LFR Lead Cooled Fast Ractor – 270

Feddersen, Falk
Analysis and Modeling of Surfzone Turbulence and Bubbles – 106

Fedotov, A. V.
Cooling Force Measurement in CELSIUS – 274

Experimental Studies of IBS in RHIC and Comparison with Theory – 262

Summary of Beam Cooling and Intrabeam Scattering – 261

Feik, C.
Trough Receiver Heat Loss Testing – 129

Feit, M. D.
Size Selection Initiation Model Extended to Include Shape and Random Factors – 197

Summary of Recent Damage-Initiation Experiments on KDP Crystals – 291

Feiveson, Al
Effects of Speed and Visual-Target Distance on Toe Trajectory During the Swing Phase of Treadmill Walking – 157

Feng, DIng-yuan
Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity – 178

Feng, Hong-qi
Development of a Complex Experimental System for Studies of Controlled Ecological Life Support Technique – 175

Ferraiolo, D. F.
Assessment of Access Control Systems – 195

Ferraiolo, H.
Personal Identity Verification Demonstration Summary – 195

Ferson, S.
Sensitivity in Risk Analyses with Uncertain Numbers – 191

Feurer, T.
Characterization of Materials with Optically Shaped Acoustic Waveforms – 272

Fieguth, P W
Multiresolution Optimal Interpolation and Statistical Analysis of Topex/Poseidon Satellite Altimetry – 238

Fieguth, Paul W
Fractal Estimation using Models on Multiscale Trees – 238

Field, Robert E.
Runtime and Pressurization Analyses of Propellant Tanks – 36

Fields, D.
Parton Orbital Angular Momentum – 262

Figueroa, F.
Sensor Networking Testbed with IEEE 1451 Compatibility and Network Performance Monitoring – 213

Filikhin, I.
Study of the (sub Lambda)(sup 7)He Hypernucleus in Formalism of the Faddeev Equations – 277

Filippidis, Arthur
Simulation Activities Using Gateway and Tactical Digital Information Links – 73

Finley, P. D.
Biological Restoration of Major Transportation Facilities Domestic Demonstration and Application Project (DDAP): Technology Develop(ment aat Sandia National Laboratories – 60

Fischer, C.
Using Pin as a Memory Reference Generator for Multiprocessor Simulation – 191

Fischer, Gerhard
Enhancing Incremental Learning Processes With Knowledge-Based Systems – 312

Fischcer, W.
Experimental Studies of IBS in RHIC and Comparison with Theory – 262

Fisher, D.
Tariff Analysis Project: A Database and Analysis Platform for Electrictiy Tariffs – 306

Fishman, Harvey
Bucky Paper as a Support Membrane in Retinal Cell Transplantation – 149

Fite, E. Brian
Aerodynamic Performance Measurements for a Forward Swept Low Noise Fan – 2

Flechsig, U.
SLS Optics Beamline – 265

Fleming, Eric L.
Mesospheric Dynamical Changes Induced by the Solar Proton Events in October-November 2003 – 145

Florian, Radu
Named Entity Recognition as a House of Cards: Classifier Stacking – 235

Floyd, J. E.
Fire Dynamics Simulator (Version 3) User’s Guide – 103

Floyd, Jason
User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 208

Fochs, S.
Directed Energy System for Defeat of Improvised Explosive Devices and Landmines – 288

Foley, G.
NERL Air Quality Research: Moving Forward. EPA-NOAA Scientists-to-Scientists Meeting. Held on March 2-3, 2004 – 137

Foltyn, S. R.
Enhanced Pinning in YBCO Films with Bazro3 Nanoparticles – 293

Fontenla, Juan M.
Model Calculations of Solar Spectral Irradiance in the 3.7 Micron Band for Earth Remote Sensing Applications – 141

Forester, C. L.
Novel Chamber Design for an In-Vacuum Cryo-Cooled Mini-Gap Undulator – 274

Forney, G. P.
Fire Dynamics Simulation (Version 2): Technical Reference Guide – 103

Fire Dynamics Simulator (Version 3) User’s Guide – 103

Foster, Kate
Simulation Activities Using Gateway and Tactical Digital Information Links – 73

Foust, Coleen
Industry Analysis for Body Armor Procurement – 186

Fowell, R. A.
Fast Access, Low Memory, Pair Catalog – 1

Fox, J.
Amplitude Linearizers for PEP-II 1.2 MW Klystrons and LLRF Systems – 294

Design and Testing of Gproto bunch-by-bunch Signal Processor – 294

Fraley, Chris
Incremental Model-Based Clustering for Large Datasets With Small Clusters – 254

Francoeur, Joe
Algorithms using Java for Spreadsheet Dependent Cell Recomputation – 240

Frank, Geoffrey J.
Materials Development for Hypersonic Flight Vehicles – 45

Frank, K.
SLS Optics Beamline – 265

Frank, S. M.
Plutonium-238 Alpha-Decay Damage Study of the Ceramic Waste Form – 58

Frankfurt, L.
Transverse Imaging of the Proton in Exclusive Diffractive PP Scattering – 279

Franz, Dave
MEMS Microshutter for James Webb Space Telescope – 318

Fratantoni, David M
An Autonomous Glider Network for the Monterey Bay Predictive Skill Experiment / AOSN-II – 10

Fredrick, David
Live Modeling of a Dyna Vision SPR-02 Sensor for Rangefinding Application – 110

Freeman, Jared
STRATA: Observer-based Measurement Agent Research Support – 64

French, Guy A
Flight Display Integration – 26

Frenklach, M.
Graphene Layer Growth: Collision of Migrating Five-Member Rings – 52

Friedlander, Arthur
Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 164

Friese, J. I.
Thermodynamics of Neptunium(V) Fluoride and Sulfate at Elevated Temperatures – 51

Frisch, J.
High Precision SC Cavity Diagnostics with Hom Measurements – 266

Frome, E. L.
Statistical Methods and Software for the Analysis of Occupational Exposure Data with Non-Detectable Values – 242

Froula, D. H.
High Magnetic Field Generation for Laser-Plasma Experiments – 270

Fry, Timothy J.
Materials Development for Hypersonic Flight Vehicles – 45

Fua, Pascal V
Registration without Correspondences – 227

Using 3-Dimensional Meshes to Combine Image-Based and Geometry Constraints – 228

Fua, P
Object-Centered Surface Reconstruction: Combining Multi-Image Stereo and Shading – 227

Fuentes, Montserrat
Model Validation and Spatial Interpolation by Combining Observations with Outputs from Numerical Models via Bayesian Melding – 244

Fukuma, H.
Perfect Electrode to Suppress Secondary Electrons Inside the Magnets – 278

Fulco, Charles S
Validation of a Shortened Electronic Version of the Environmental Symptoms Questionnaire – 160

Fulkerson, S.
High Magnetic Field Generation for Laser-Plasma Experiments – 270

Fulton, M. L.
Concept for Lightweight Spaced-Based Deposition Technology – 28

Furman, M. A.
New Simulation Capabilities of Electron Clouds in Ion Beams with Large Tune Depression – 279

Furman, M. S.
Studies of E-Cloud Build up the the FNAL Main Injector and for the LHC – 265

Gaasterland, Terry
Summarization-Inspired Temporal-Relation Extraction: Tense-Pair Templates and Treebank-3 Analysis – 253

Gaffney, R. L.
The Art of Extracting One-Dimensional Flow Properties from Multi-Dimensional Data Sets – 24

Gallagher, D. L.
Origin and Evolution of Deep Plasmaspheric Notches – 326

Gallimore, Richard
Use of a Spacer Vest to Increase Evaporative Cooling Under Military Body Armor – 297

Gallimore, S. D.
Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel – 26

Galnander, B.
Cooling Force Measurement in CELSIUS – 274

Gandy, D.
Combustion Turbine (CT) Hot Section Coating Life Management. (Final Report) – 60

Ganesan, Kavita
Automated Story Capture From Conversational Speech – 301

Gao, Lijun
Soldier System Power Sources – 131

Gao, Shu-jing
Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity – 178

Gao, Yun-fang
Prophylactic Effects of Choline Chloride on Muscle Atrophy in Tail-suspended Rats – 177

Garces, Rodrigo
A Near-Optimum Channel Access Protocol Based on Incremental Collision Resolution and Distributed Transmission Queues – 217

Floor Acquisition Multiple Access with Collision Resolution – 216

Garcia, A. P.
Fluorescence Visualization of Hypersonic Flow Past Triangular and Rectangular Boundary-layer Trips – 4

Garcia-Luna-Aceves, J J
A Near-Optimum Channel Access Protocol Based on Incremental Collision Resolution and Distributed Transmission Queues – 217

Floor Acquisition Multiple Access with Collision Resolution – 216

Garrison, Daniel
Ar-39-Ar-40 Ages of Two Nakhlites, MIL03346 and Y000593: A Detailed Analysis – 327

Garwin, E. L.
Projected Life of the SLAC Linac Braze Joints: Braze Integrity and Corrosion of Cooling Water Hardware on Accelerator Sections – 278

Gary, M.
Certification of Completion of Level-2 Milestone 461: Deploy First Phase of I/O Infrastructure for Purple – 260

Gates, Gary
Navy Energy/Water Program and Applicable Process Technologies – 133

Gatlin, Greg
Progress in Flaps Down Flight Reynolds Number Testing Techniques at the NTF – 12

Gay, R.
NASA CEV Reference Entry GN&C System and Analysis – 21

Gayle, F. W.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Contemporaneous Structural Steel Specifications. NIST NCSTAR 1-3A – 120

Gehrels, N.
The Swift/BAT Hard X-ray Survey – 321

Geiger, Gadi
Perceptual Evaluation of Video-Realistic Speech – 71

Gel, Yulia
Calibrated Probabilistic Mesoscale Weather Field Forecasting: The Geostatistical Output Perturbation (GOP) Method – 146

Geldman, L. C.
Devices with Small-Scale Channels and the Fabrication Thereof by Etching – 89

Gelfand, Saul B
Simulated Annealing Type Algorithms for Multivariate Optimization – 248

Gemberling, S.
Performance, Thermal, and Vibration Qualification Testing of Zetec Acoustic Transducers, Model Z0002659-2, Sondicator Probes – 282

Geng, Xi-chen
Protection Effects of a New Combined Anti-G Measure – 174

Gentilman, Richard
Transparent Yttria for IR Windows and Domes - Past and Present – 292

Genton, Marc G
Calibrated Probabilistic Forecasting at the Stateline Wind Energy Center: The Regime-Switching Space-Time (RST) Method – 147

George, Bryan
Exploring Speech-Enabled Dialogue with the Galaxy Communicator Infrastructure – 217

George, David
Phase I Cultural Resources Survey and Archeological Inventory of a Proposed 1.12 ha (2.87 ac) Borrow Pit and an Associated Access Road, Ascension Parish, Louisiana – 126

George, Gary R
Intelligent Agents for Computer-Generated Forces – 9

George, J. S.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Gerhart, Grant R
The Bekker Model Analysis for Small Robotic Vehicles – 229

Germann, Ulrich
Fast Decoding and Optimal Decoding for Machine Translation – 239

Gervasio, Melinda
A Personalized Calendar Assistant – 311

Ghaffari, A
Control of Electric Field Domain Formation in Multiquantum Well Structures – 281

Ghosh, S. K.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of Building Code Structural Requirements. NIST NCSTAR 1-1B – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design and Construction of Structural Systems. NIST NCSTAR 1-1A. (Appendices not included) – 300

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Maintenance and Modifications to Structural Systems. NIST NCSTAR 1-1C. (Appendices not included) – 117

Giese, Martin A
Biologically Plausible Neural Model for the Recognition of Biological Motion and Actions – 225

Giglio, J. J.
Plutonium-238 Alpha-Decay Damage Study of the Ceramic Waste Form – 58

Gilde, Gary
The Effect of Hot Isostatic Pressing on the Optical Properties Of Spinel – 62

Gill-Hesselgrave, D
Using Human Systems Integration and Knowledge Engineering to Define and Design Anti-Terrorism/Force Protection Systems and Solutions – 183

Gillick, Larry
Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

Rapid Match Training for Large Vocabularies – 313

Girard, Mary M
Dual Use of Commercial Avionics Data Links for the U.S. Air Force – 73

Giver, L. P.
Zeeman Tuning Rates in the v3 Band of NO2 – 110

Glass, David E.
Materials Development for Hypersonic Flight Vehicles – 45

Glesener, W. F.
Projected Life of the SLAC Linac Braze Joints: Braze Integrity and Corrosion of Cooling Water Hardware on Accelerator Sections – 278

Glorioso, Mark V.
Extending NASA Research Results to Benefit Society: Rapid Prototyping for Coastal Applications – 126

Gneiting, Tilmann
Calibrated Probabilistic Forecasting at the Stateline Wind Energy Center: The Regime-Switching Space-Time (RST) Method – 147

Calibrated Probabilistic Mesoscale Weather Field Forecasting: The Geostatistical Output Perturbation (GOP) Method – 146

Strictly Proper Scoring Rules, Prediction and Estimation – 255

Using Bayesian Model Averaging to Calibrate Forecast Ensembles – 146

Godfroy, Thomas J.
Radio-Frequency Driven Dielectric Heaters for Non-Nuclear Testing in Nuclear Core Development – 285

Goff, K. M.
Plutonium-238 Alpha-Decay Damage Study of the Ceramic Waste Form – 58

Gomboc, Dave
Building Explainable Artificial Intelligence Systems – 223

Explainable Artificial Intelligence for Training and Tutoring – 220

Reflective Tutoring for Immersive Simulation – 220

Gonzalez, Gerardo O
Analyzing the Structure of Air Force Space Acquisitions – 29

Gonzalez, Julio A
Clothing Ventilation Estimates From Manikin Measurements – 184

Forced Ventilation of Protective Garments for Hot Industries – 185

Transient Sweat Rate Calculation from Humidity Measurements Under Clothing – 297

Use of a Spacer Vest to Increase Evaporative Cooling Under Military Body Armor – 297

Goodman, John
Lessons Learned From Seven Space Shuttle Missions – 33

Goodman, Seymour E
Information Warfare and International Law – 314

Goodwin, Thomas J.
An Optimization of Pulsed ElectroMagnetic Fields Study – 156

Gordon, Andrew S
Automated Commonsense Reasoning About Human Memory – 219

Automated Story Capture From Conversational Speech – 301

Commonsense Psychology and the Functional Requirements of Cognitive Models – 219

Gosink, L.
HDF5-Fast Query: An API for Simplifying Access to Data Storage, Retrieval, Indexing and Querying – 302

Gottardo, Raphael
Robust Estimation of cDNA Microarray Intensities with Replicates – 245

Gounelle, M.
A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 328

Gowan, John W., Jr.
Crew Exploration Vehicle Ascent Abort Coverage Analysis – 31

Graap, Ken

A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Gradl, W.

Probing QCD with Rare Charmless B Decays – 263

Gradnik, Tim

Importance of Cooling System Optimization with Regard to Lifetime and Reliability of Power Transformers – 76

Grady, B.

Characterization of Lubricants on Ball Bearings by FT-IR Using an Integrating Sphere – 52

Graehl, Jonathan

Training Tree Transducers – 230

Gratch, J

Simulation Meets Hollywood: Integrating Graphics, Sound, Story and Character for Immersive Simulation – 200

Gratch, Jonathan

Creating Interactive Virtual Humans: Some Assembly Required – 205

Evaluating a Computational Model of Emotion – 233

Evaluating a Computational Model of Social Causality and Responsibility – 254

Evaluating Social Causality and Responsibility Models: An Initial Report – 222

Mitigation Theory: An Integrated Approach – 249

Toward a New Generation of Virtual Humans for Interactive Experiences – 205

Virtual Rapport – 218

Grave, I

Control of Electric Field Domain Formation in Multiquantum Well Structures – 281

Voltage-Controlled Tunable GaAs/AlGaAs Multistack Quantum Well Infrared Detector – 108

Gray, L.

LLNL Heavy Element Facility-Facility Management, Authorization Basis, and Readiness Assessment Lessons Learned in the Heavy Element Facility (B251) Transition from Category II Nuclear Facility to Radiological Facility – 137

Greegor, R. B.

Metamaterial Scanning Lens Antenna Systems and Methods – 70

Green, Lawrence L.

Uncertainty Analysis of Historical Hurricane Data – 145

Green, P.

Safety and Usability of Speech Interfaces for In-Vehicle Tasks while Driving: A Brief Literature Review – 184

Greenberg, Ira

A Storage System for Scalable Knowledge Representation – 309

Greenberg, Lawrence T

Information Warfare and International Law – 314

Greene, M.

How Accurately Can We Calculate Neutrons Slowing Down in Water – 271

Greenfield, Michael A

Numerical Methods for Analysis of Charged Vacancy Diffusion in Dielectric Solids – 95

Gregori, G.

Solid-Density Plasma Characterization with X-Ray Scattering on the 200-J Janus Laser – 271

Grgic, Goran

Development of the System for Determination of the Size-of-Source Effect – 75

Grgie, Goran

Uncertainty of the Characteristic of the Size-of-Source Effect in Radiation Thermometers – 82

Grier, D. G.

Apparatus for Using Optical Tweezers to Manipulate Materials – 288

Griffin, Fred T

A Wide-Band Video Noise Source, 50 KC to 10 MC – 108

Griffith, R. O.

Biological Restoration of Major Transportation Facilities Domestic Demonstration and Application Project (DDAP): Technology Develop(ment aat Sandia National Laboratories – 60

Griffiths, Bob

Progress in Flaps Down Flight Reynolds Number Testing Techniques at the NTF – 12

Grigoryan, V.

Optical Regenerative Amplifier for Binary Phase Shift-Keying Signals – 289

Grill, R. A.

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Amendments to the Fire Protection and Life Safety Provisions of the New York City Building Code by Local Laws Adopted While World Trade Center 1, 2, and 7 Were in Use. NIST NCSTAR 1-1G – 121

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of Codes, Standards, and Practices in Use at the Time of the Design and Construction of World Trade Center 1, 2, and 7. NIST NCSTAR 1-1E – 118

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of the 1968 and Current (2003) New York City Building Code Provisions. NIST NCSTAR 1-1F – 118

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Documentation of the Fuel System for Emergency Power in World Trade Center 7. NIST NCSTAR 1-1J – 63

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Fire Protection and Life Safety Provisions Applied to the Design and Construction of WTC 1, 2, 7 and Post-Construction Provisions Applied After Occupancy. NIST NCSTAR 1-1D – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety, and Structural Systems of World Trade Center 7. NIST NCSTAR 1-1I – 120

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety Systems of the World Trade Center Towers. NIST NCSTAR 1-1H – 121

Grosz, Barbara

A Team User's Guide – 314

Grupen, Rod

A Framework for Learning Declarative Structure – 239

Grupen, Roderic

Designing a Self-Stabilizing Robot for Dynamic Mobile Manipulation – 225

Gueldner, D. R.

CETIS: Complex Effluents Toxicity Information System. CETIS Retrieval System User's Manual – 306

Guidotti, R. A.

Thermally-Related Safety Issues Associated with Thermal Batteries – 130

Guillorn, M. A.

Vertically Aligned Nanostructure Scanning Probe Microscope Tips – 41

Guillory, Erika

Digital Learning Network Education Events of NASA's Extreme Environments Mission Operations – 331

Gunawan, R.

Methods for Controlling Dopant Concentration and Activation in Semiconductor Structers – 93

Gunes, Hasan

Gappy Data: To Krig or Not To Krig – 242

Guo, Hong-yun

Effects of Irradiation with Different Dose Rates of X-ray on Mouse Immune System – 177

Guo, Shuang-sheng

Development of a Complex Experimental System for Studies of Controlled Ecological Life Support Technique – 175

Guo, Yi

Enhancement of Stochastic Resonance Using Optimization Theory – 249

Gupta, I. J.

EM Threat Analysis for Wireless Systems – 71

Hardware-in-the-Loop Testing of Wireless Systems in Realistic Environments – 70

Gurd, P.
SNS Cryogenic Systems Commissioning – 295

Gurkan, Deniz
Sensor Networking Testbed with IEEE 1451 Compatibility and Network Performance Monitoring – 213

Guttman, Joshua D
Authentication Tests and the Structure of Bundles – 229

Protocol Independence through Disjoint Encryption – 212

Guynn, Mark D.
High Altitude Long Endurance Air Vehicle Analysis of Alternatives and Technology Requirements Development – 14

Haas, Michael
Improving Human Interfaces in Military Simulation Applications – 210

Hafley, Robert A.
Electron Beam Freeform Fabrication in the Space Environment – 319

Hahn, Daniel
The Effect of Hot Isostatic Pressing on the Optical Properties Of Spinel – 62

Hall, Callie M.
Extending NASA Research Results to Benefit Society: Rapid Prototyping for Coastal Applications – 126

Hall, Callie
Sensor to User - NASA/EOS Data for Coastal Zone Management Applications Developed from Integrated Analyses: Verification, Validation and Benchmark Report – 125

Hall, J.
Analysis of a Gross Counting Decision Metric for Use in Threat Detection During Cargo Container Inspection – 269

Hall, Kurt D
Near Space: Should Air Force Space Command Take Control of Its Shore? – 18

Hamins, A.
Fire Dynamics Simulation (Version 2): Technical Reference Guide – 103

Hammerstein, Josh
Defense in Depth: Foundation for Secure and Resilient IT Enterprises – 218

Han, Changhee
Applying Perceptually Driven Cognitive Mapping to Virtual Urban Environments – 229

Han, JungHyun
Hierarchical Role-based Viewing for Multi-level Information Security in Collaborative CAD – 307

Han, M. K.
Rare-earth Transition-Metal Intermetallics: Structure-Bonding-Property Relationships – 48

Han, Xiao-dong
Fitting APD Restitution with Artificial Neural Network – 174

Hanlet, P.
High Field Solenoid Magnets for Muon Cooling – 261

Hannon, F. E.
Simulation and Optimisation of a 100MA DC Photo-Injector – 258

Hansen, R.
Trough Receiver Heat Loss Testing – 129

Hao, Ji-fang
Effects of Irradiation with Different Dose Rates of X-ray on Mouse Immune System – 177

Harabagiu, Sanda
Question Answering Based on Semantic Structures – 301

Hardin, Larry
Solid Oxide Fuel Cell APU Feasibility Study for a Long Range Commercial Aircraft Using UTC ITAPS Approach – 22

Hardy, J. E.
Automation & Characterization of US Air Force Bench Top Wind Tuunnels. Summary Report – 26

Hardy, J.
In-vivo Imaging of the Photoreceptor Mosaic in Retinal Dystrophies and Correlation with Visual Function – 290

Hare, D. E.
CALE EOS Form 2 Fits for High Pressure Fused Silica Hugoniot Data – 39

Harine, Katherine J.
Radiation and Plasma Environments for Lunar Missions – 333

Harper, W. W.
Laser-Based Spectroscopic Detection Techniques – 288

Harringa, J. L.
Ultra-Hard Low Friction Coating Based on ALMGB14 for Reduced Wear on MEMS and Other Tribiological Components and System – 59

Harris, D. A.
Statistical Loads Data for the Boeing 777-200ER Aircraft in Commercial Operations – 15

Harrison, Catherine R
Principles of Fit to Optimize Helmet Sizing – 185

Harshman, R. A.
Temporal Analysis of Social Networks Using Three-Way DEDICOM – 198

Hart, Stephen
A Framework for Learning Declarative Structure – 239

Hartle, R. E.
Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

Harvin, S. F.
Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel – 26

Hasselbrink, E. F.
Mobile Monolithic Polymer Elements for Flow Control in Microfluidic Devices – 102

Hatamleh, Omar
The Effects of Laser Peening and Shot Peening on Mechanical Properties in Friction Stir Welded 7075-T7351 Aluminum – 54

Hatfield, D.
SNS Cryogenic Systems Commissioning – 295

Haugan, T J
Effect of O2 Partial Pressure on YBa2Cu3O7-delta Thin Film Growth by Pulsed Laser Deposition – 54

Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint) – 61

Haupt, Tomasz A
User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 208

Hau-Riege, S.
Phase Effects on Mesoscale Object X-ray Attenuation Radiographs – 259

Hawkins, Tim
Acquisition of Time-Varying Participating Media – 107

Haynes, R. W.
Northwest Forest Plan-The First 10 Years (1994-2003): Synthesis of Monitoring and Research Results – 136

Haynes, T. E.
Devices with Small-Scale Channels and the Fabrication Thereof by Etching – 89

He, Y.
Concurrent Single-Executable CCSM with MPH Library – 196

He, Yun
Multiscale Signal Processing and Shape Analysis for an Inverse Sar Imaging System – 109

He, Zhi-xian
Prophylactic Effects of Choline Chloride on Muscle Atrophy in Tail-suspended Rats – 177

Heath, S. W.
Risk Management and Medical Liability: A Manual for Indian Health Service and Tribal Health Care Professionals. Second Edition – 304

Hector Rivetta, C.
Amplitude Linearizers for PEP-II 1.2 MW Klystrons and LLRF Systems – 294

Heeringa, Brent
Estimating Grammar Parameters using Bounded Memory – 239

Two Algorithms for Learning the Parameters of Stochastic Context-Free Grammars – 239

Helman, Vera
Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

Helton, J. C.
Survey of Sampling-Based Methods for Uncertainty and Sensitivity Analysis – 242

Verification Test Problems for the Calculation of Probability of Loss of Assured Safety in Temperature-Dependent Systems with Multiple Weak and Strong Links – 190

Hemsch, Michael J.
Statistical Analysis of CFD Solutions from the Third AIAA Drag Prediction Workshop – 243

Hendricks, Robert C.
Turbomachinery Clearance Control – 115

Hendrickson, L.
High Precision SC Cavity Diagnostics with Hom Measurements – 266

Henestroza, E.
Ion Motion in the Adiabatic Focuser – 296

Henley, Greg
User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 208

Herman, M. W.
Nuclear Reaction and Structure Databases of the National Nuclear Data Center – 323

Hernandez-Garcia, C.
Simulation and Optimisation of a 100MA DC Photo-Injector – 258

Herring, Larry J
A Comparison of the Navy and the Air Force Budgeting and Execution Process for Aviation Fuel (AVFUEL) – 64

Hess, Larry
MEMS Microshutter for James Webb Space Telescope – 318

Hesse, Michael
How Does Collisionless Magnetic Reconnection Work in the Presence of a Guide Magnetic Field? – 94

Heumphreus, Garey R
Energy and Utilities Readiness for the Army Industrial Activities – 133

Hick, W. R.
JLAB Ampere-Clast Cryomodule Conceptual Design – 260

Hildenbrand, D. L.
Methods and Apparatuses for Producing Metallic Compositions via Reduction of Metal Halides – 55

Hill, E.
Investigations of Performance of Pneumatic Deicing Boots, Surface Ice Detectors, and Scaling of Intercycle Ice – 2

Hill, Jr , Randall W
Applying Perceptually Driven Cognitive Mapping to Virtual Urban Environments – 229

Hill, Jr, Randall W
Modeling Dynamic Perceptual Attention in Complex Virtual Environments – 200

Hill, P. O.
Semiconductor Conductive Layers – 89

Hill, Randall
Toward a New Generation of Virtual Humans for Interactive Experiences – 205

Hill, R
Simulation Meets Hollywood: Integrating Graphics, Sound, Story and Character for Immersive Simulation – 200

Hill, Stephen W
Dual Use of Commercial Avionics Data Links for the U.S. Air Force – 73

Hinchey, Michael G.
A Model-Driven Architecture Approach for Modeling, Specifying and Deploying Policies in Autonomous and Autonomic Systems – 224

Hink, P. L.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Hinkel, Heather
NASA CEV Reference GN&C Architecture – 21

Hirsch, David
Pressure Effects on Oxygen Concentration Flammability Thresholds of Materials for Aerospace Applications – 35

Hirschman, Lynette
Experiments in Evaluating Interactive Spoken Language Systems – 315

MiTAP for Bio-Security: A Case Study – 311

Hofer, J. H.
Phase Transformation of ‘Chem-prep’ PZT 95/5-2Nb HF 1035 Ceramic Under Quasi-static Loading Conditions – 60

Hoff, Peter D
Bilinear Mixed Effects Models for Dyadic Data – 245

Hofler, A.
High Gradient Operation with the CEBAF Upgrade RF Control System – 268

Hogan, J B
Toxicological Evaluation of Depleted Uranium in Rats: Six-Month Evaluation Point – 168

Hogan, Patrick
Transparent Yttria for IR Windows and Domes - Past and Present – 292

Holder, J. P.
Time-Resolved Soft X-Ray Imaging (SXRI) Diagnostic for Use at the NIF and OMEGA Lasers – 270

Holder, Lawrence B
Iterative Structure Discovery in Graph-Based Data – 249

Subdue: Compression-Based Frequent Pattern Discovery in Graph Data – 302

Holland, B J
Measured Effects of a Narrowband Interference Suppressor on GPS Receivers – 99

Holman, Barry W
Defense Infrastructure: Continuing Challenges in Managing DOD Lodging Programs as Army Moves to Privatize Its Program – 122

Holmes, Philip
Towards a Factored Analysis of Legged Locomotion Models – 229

Holt, Shawn E
Molecular Mechanisms of Prostate Cancer Progression – 171

Hom, Sandra
A Methodology for Improving the Shipyard Planning Process: Using KVA Analysis, Risk Simulation and Strategic Real Options – 100

Hong, Feng
Space Medicine and Medical Engineering, Volume 19, No. 5 – 174

Hoover, Carol L
Analytical Design of Evolvable Software for High-Assurance Computing – 208

Hoover, Richard B.
Trichococcus Patagoniensis sp. nov., a Facultative Anaerobe that grows at -5 C, Isolated from Penguin Guano in Chilean Patagonia – 155

Hopkinson, T M
Measured Effects of a Narrowband Interference Suppressor on GPS Receivers – 99

Hopper, Darrel G
Flight Display Integration – 26

Horowitz, Moshe
Dispersion Management in a Harmonically Mode-Locked Fiber Soliton Laser – 111

Horvath, Thomas J.
Discrete Roughness Transition for Hypersonic Flight Vehicles – 3

Hosangadi, Ashvin
Runtime and Pressurization Analyses of Propellant Tanks – 36

Hostikka, S.
Fire Dynamics Simulator (Version 3) User’s Guide – 103

Housel, Thomas
A Methodology for Improving the Shipyard Planning Process: Using KVA Analysis, Risk Simulation and Strategic Real Options – 100

Hovater, C.
Commissioning of the Digital LLRF for CEBAF Injector/Separator – 269

High Gradient Operation with the CEBAF Upgrade RF Control System – 268

Hovy, E
Simulation Meets Hollywood: Integrating Graphics, Sound, Story and Character for Immersive Simulation – 200

Howell, D.
SNS Cryogenic Systems Commissioning – 295

Hsu, J. S.
Simplified Hybrid Secondary Uncluttered Machine and Method – 88

Hsu, K. T.
Vertical Beam Size Control in TLS and TPS – 275

Hsu, O. C,
Control of the ST7 Disturbance Reduction System Flight Experiment – 34

Hu, J. P.
Novel Chamber Design for an In-Vacuum Cryo-Cooled Mini-Gap Undulator – 274

Hu, J. S.
Integrated Inverter for Driving Multiple Electric Machines – 89

Hu, Ron
MEMS Microshutter for James Webb Space Telescope – 318

Hu, V. C.
Assessment of Access Control Systems – 195

Huang, Frank T.
Modeling the Observed Solar Cycle Variations of the Quasi-biennial Oscillation (QBO): Amplification by Wave Forcing – 144

Huang, Leping
CARAVAN: Providing Location Privacy for VANET – 68

Huang, Yi
Antineoplastic Efficacy of Novel Polyamine Analogues in Human Breast Cancer – 165

Huang, Zezhen
Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

Huie, Philip
Bucky Paper as a Support Membrane in Retinal Cell Transplantation – 149

Humblet, Pierre A
The Throughput of Wavelength Routing Networks – 83

Humphrey, T E
Solid-State and Vacuum Thermionic Energy Conversion – 134

Humphreys, William M.
MEMS Based Acoustic Array – 281

Hung, Ching-Cheh
Carbon Materials Metal/Metal Oxide Nanoparticle Composite and Battery Anode Composed of the Same – 44

Hung, Chou
Selectivity of Local Field Potentials in Macaque Inferior Temporal Cortex – 226

Hunter, Craig A.
Three-Dimensional Computational Model for Flow in an Over-Expanded Nozzle With Porous Surfaces – 1

Hunter, M. C.
Polymerization Welding and Application to Microfluidics – 60

Huskey, A.
International Electrotechnical Commission Standard IEC 61400-11 and Other Procedures. Acoustic Noise Measurement Techniques – 283

Hutchins, Terry
Reduced Air Emissions for Hard Chrome Plating at the NADEP NAS North Island, San Diego Using an Alternative Emission Control Technology – 140

Hyde, J.
STS-114 Micrometeoroid/Orbital Debris (MMOD) Post-Flight Assessment – 330

Hyde-Wright, C. E.
Transverse Imaging of the Proton in Exclusive Diffractive PP Scattering – 279

Ilic, B.
Vertically Aligned Nanostructure Scanning Probe Microscope Tips – 41

Ingersoll, D. T.
Status of Physics and Safety Analyses for the Liquid Salt Cooled Very High Temperature Reactor (LS-VHTR) – 285

Ingram, JoAnne L.
Carbon Nanotube Based Light Sensor – 78

Inma, J. A.
Fluorescence Visualization of Hypersonic Flow over Rapid Prototype Wind-Tunnel Models – 4

Inman, Jennifer A.
Fluorescence Visualization of Hypersonic Flow Past Triangular and Rectangular Boundary-layer Trips – 4

Irwin, J.
Lensing Signals in the Hubble Ultra-Deep Field Using All 2nd-Order Shape Deformations – 321

Ishida, M.
X-Ray Spectral Study of the Photoionized Stellar Wind in Vela X-1 – 324

Ishisaki, Y.
X-Ray Spectral Study of the Photoionized Stellar Wind in Vela X-1 – 324

Israel, M. H.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Ito, Yoshiko
Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

Itoh, Yoshifumi
Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 164

Ittmann, Michael
The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer – 157

Ivanov, A.
Spark Ignition Aircraft Engine Endurance Test of Aviation-Grade Ethanol 85 – 37

Iwaniec, Urzula T
Central Leptin Gene Therapy to Reduce Breast Cancer Risk Factors – 166

Iyer, K
Emotionally Evocative Environments for Training – 212

Iyer, Kumar
Building Robust Planning and Execution Systems for Virtual Worlds – 203

Development of a Data Management Tool for Investigating Multivariate Space and Free Will Experiences in Virtual Reality – 201

Izumi, N.
Multispectral X-Ray Imaging for Core Temperature and Density Maps Retrieval in Direct Drive Implosions – 272

Jackman, Charles H.
Mesospheric Dynamical Changes Induced by the Solar Proton Events in October-November 2003 – 145

Jackman, Rachel
Corrosion Preventing Characteristics of Military Hydraulic Fluids. Part 2 – 57

Jacobson, G.
Performance, Thermal, and Vibration Qualification Testing of Zetec Acoustic Transducers, Model Z0002659-2, Sondicator Probes – 282

Jacobson, S. C.
Methods for Forming Small-Volume Electrical Contacts and Material Manipulations with Fluidic Microchannels – 104

Jaczkowski, Jeffrey J
Robotic Follower Experimentation Results – 221

Jafar, Eric
Process Improvement at the Aircraft Intermediate Maintenance Detachment (AIMD) at Naval Air Station Whidbey Island – 5

Jahr, Michael
Fast Decoding and Optimal Decoding for Machine Translation – 239

James, D. L.
Time-Resolved Soft X-Ray Imaging (SXRI) Diagnostic for Use at the NIF and OMEGA Lasers – 270

James, Rachael H.
The Origin of Dark Inclusions in Allende: New Evidence from Lithium Isotopes – 330

Jansson, A.
Round Robin Testing Exercise on Method 8C of the STANAG 4360 – 59

Jaworske, Donald A.
Post Irradiation Evaluation of Thermal Control Coatings and Solid Lubricants to Support Fission Surface Power Systems – 114

Jensen, James O
New Hyperspectral Discrimination Measure for Spectral Characterization – 228

Jenson, Christopher
Industry Analysis for Body Armor Procurement – 186

Jernigan, D.
Validation Experiments to Determine Radiation Partitioning of Heat Flux to an Object in a Fully Turbulent Fire – 104

Jhabvala, Murzy
MEMS Microshutter for James Webb Space Telescope – 318

Jiang, Nan
Heat Transfer and Fluid Dynamics Measurements in the Expansion Space of a Stirling Cycle Engine – 37

Jiang, Qing-yan
Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity – 178

Jiang, Shi-zhong
Space Medicine and Medical Engineering, Volume 19, No. 5 – 174

Jiang, Z
Magnetization Losses in Multifilament Coated Superconductors (Postprint) – 280

Jiang, Zhong-Ping
Enhancement of Stochastic Resonance by Tuning System Parameters and Adding Noise Simultaneously – 248

Enhancement of Stochastic Resonance Using Optimization Theory – 249

Jin, Zhao
Protection Effects of a New Combined Anti-G Measure – 174

Johnson, B. R.
FY 2005 Miniature Spherical Retroreflectors Final Report – 258

Johnson, Charles L.
Electrodynamic Tether – 32

Johnson, D. A.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Documentation of the Fuel System for Emergency Power in World Trade Center 7. NIST NCSTAR 1-1J – 63

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Fire Protection and Life Safety Provisions Applied to the Design and Construction of WTC 1, 2, 7 and Post-Construction Provisions Applied After Occupancy. NIST NCSTAR 1-1D – 117

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety, and Structural Systems of World Trade Center 7. NIST NCSTAR 1-1I – 120

Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Modifications to Fire Protection and Life Safety Systems of the World Trade Center Towers. NIST NCSTAR 1-1H – 121

Johnson, Glenn R
Evolution of Catabolic Pathways for Synthetic Compounds Bacterial Pathways for Degradation of 2,4-dinitrotoluene and Nitrobenzene – 164

Johnson, J. D.
Survey of Sampling-Based Methods for Uncertainty and Sensitivity Analysis – 242

Verification Test Problems for the Calculation of Probability of Loss of Assured Safety in Temperature-Dependent Systems with Multiple Weak and Strong Links – 190

Johnson, L.
Report Back from the NCI-Wide Workshop: Enhancing Interactions to Reduce Cancer Health Disparities. Held on July 17th, 2006 – 306

Johnson, Nicholas
Mission Success and Environmental Protection: Orbital Debris Considerations – 317

Johnson, R. E.
Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

Johnson, R. P.
High Field Solenoid Magnets for Muon Cooling – 261

Johnson, Wyatt
Numerical Skip-Entry Guidance – 32

Jones, M. K.
Spin Structure Functions: Proton/Deuteron Measurements in the Resonance Region – 276

Jones, R. W.
Automation & Characterization of US Air Force Bench Top Wind Tuunnels. Summary Report – 26

Jones, S.
In-vivo Imaging of the Photoreceptor Mosaic in Retinal Dystrophies and Correlation with Visual Function – 290

Jones, T.
Statistical Loads Data for the Boeing 777-200ER Aircraft in Commercial Operations – 15

Jordan, Jeffrey D.
Carbon Nanotube Based Light Sensor – 78

Jordan, K.
Bunch Length Measurements at the JLab FEL Using Coherent Transition and Synchrotron Radiation – 294

Jorgensen, C. C.
Feedback Linearized Aircraft Control Using Dynamic Cell Structure – 25

Jozwiak, Rachel
A Comparison of the Detection Rates for Infrared and Visual Imagery of a Person Holdina an RPG – 109

Junell, Justin
Overview of Engineering Design and Analysis at the NASA John C. Stennis Space Center – 22

Jung, M. Y. L.
Methods for Controlling Dopant Concentration and Activation in Semiconductor Structers – 93

Jung, Tzyy-Ping
Analysis of fMRI Data by Blind Separation into Independent Spatial Components – 169

Jupiter, David L
The Development of a Business Case Analysis for the Acquisition of the Agile Rapid Global Combat Support System Used for the USA Marine Corps' Ground Equipment – 66

Kacic, Zdravko
Statistical Alignment Models in Machine Translation from Slovenian to English – 186

Kahn, S. A.
High Field Solenoid Magnets for Muon Cooling – 261

Kahn, S. M.
X-Ray Spectral Study of the Photoionized Stellar Wind in Vela X-1 – 324

Kalberer, J.
Evaluation of a New Liquid Fire-Extinguishing Agent for Combustible Metal Fires – 42

Kaleps, Ints
Effects of Head Mounted Devices on Head-Neck Dynamic Response to +GZ Accelerations – 180

Kallmann, Marcelo
Scalable Solutions for Interactive Virtual Humans that can Manipulate Objects – 202

Kallosh, R.
Exact Attractive Non-BPS STU Black Holes – 326

Kalluru, Rajamohan R.
Fiber Optic Raman Sensor to Monitor Concentration Ratio of Nitrogen and Oxygen in a Cryogenic Mixture – 286

Kameyama, Megumi
Stressed and Unstressed Pronouns: Complementary Preferences – 226

Kamhawi, Hilmi
A Simplified Approach for the Rapid Generation of Transient Heat-Shield Environments – 34

Kamneva, Natalia Y
A Network Optimization Approach for Improving Organizational Design – 247

Response Surface Methodology – 232

Kang, Intae
A Comparison of Power-Efficient Broadcast Routing Algorithms – 132

A Novel Power-Efficient Broadcast Routing Algorithm Exploiting Broadcast Efficiency – 132

Design Issues on Broadcast Routing Algorithms using Realistic Cost-Effective Smart Antenna Models – 237

Maximizing Static Network Lifetime of Wireless Broadcast Adhoc Networks – 131

Kang, Y.
Recuperator Assembly and Procedures – 23

Kanki, Barbara G.
Operational Interventions to Maintenance Error – 5

Kapel, Mike
Environmental Support to Space Launch – 30

Kaplan, Ronald M
Speed and Accuracy in Shallow and Deep Stochastic Parsing – 241

Kapus-Kolar, Monika
E-LOTOS-Based Compositional Service-Based Synthesis of Multi-Party Time-Sharing-Based Protocols – 77

Karl, W C
A Wavelet-Based Method for Multiscale Tomographic Reconstruction – 256

Efficient Multiscale Regularization with Applications to the Computation of Optical Flow – 106

Multiresolution Optimal Interpolation and Statistical Analysis of Topex/Poseidon Satellite Altimetry – 238

Multiscale Representations of Markov Random Fields – 243

Optical Flow Computation via Multiscale Regularization – 98

Karl, William C
Multiscale Representations of Markov Random Fields – 247

Karniadakis, George E
Gappy Data: To Krig or Not To Krig – 242

Karovska, Margarita
Direct Imaging of Stellar Surfaces: Results from the Stellar Imager (SI) Vision Mission Study – 325

Karp, Peter D
A Storage System for Scalable Knowledge Representation – 309

Kasai, S
Magnetization Losses in Multifilament Coated Superconductors (Postprint) – 280

Kath, W L
Analysis of PMD Compensators With Fixed DGD Using Importance Sampling – 98

Katti, R. R.
Bias-Adjusted Giant Magnetoresistive (GMR) Devices for Magnetic Random Access Memory (MRAM) Applications – 70

Kaxiras, E
Virtual Design and Testing of Materials: A Multiscale Approach – 40

Kazanietz, Marcelo G
Effect of Chimaerins, Novel Receptors for Phorbol Esters, on Breast Cancer Cell Proliferation and Cell Cycle Progression – 165

Kearney, D.
Thermal Storage Commercial Plant Design Study for a 2-Tank Indirect Molten Salt System. Final Report for May 13, 2002 to December 31, 2004 – 127

Kebukawa, Yoko
In-situ micro-FTIR Study of Thermal Changes of Organics in Tagish Lake Meteorite: Behavior of Aliphatic Oxygenated Functions and Effects of Minerals – 328

Keiser, D. D.
Fuel-Cladding Interaction Layers in Irradiated U-Zr and U-Pu Zr Fuel Elements – 40

Kelley, Michael C
Telescopic Imaging of Heater-Induced Airglow at HAARP – 326

Kelly, B.
Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 1: Preferred Plant Size. Report for January 20, 2005 to December 31, 2005 – 129

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 2: Comparison of Wet and Dry Rankine Cycle Heat Rejection. Report for January 20, 2005 to December 31, 2005 – 128

Nexant Parabolic Trough Solar Power Plant Systems Analysis. Task 3: Multiple Plants at a Common Location. Report for January 20, 2005 to December 31, 2005 – 128

Thermal Storage Commercial Plant Design Study for a 2-Tank Indirect Molten Salt System. Final Report for May 13, 2002 to December 31, 2004 – 127

Kelly, Dan
MEMS Microshutter for James Webb Space Telescope – 318

Kelly-Reid, J. E.
Postsecondary Institutions in the USA: Fall 2005 and Degrees and Other Awards Conferred: 2004-05. First Look – 304

Keltner, J.
In-vivo Imaging of the Photoreceptor Mosaic in Retinal Dystrophies and Correlation with Visual Function – 290

Kendig, M. W.
Method and System for Identifying Damage to a Wire – 92

Methods and Systems for Testing Wire Insulation – 92

Kennea, J. A.
The Swift/BAT Hard X-ray Survey – 321

Kennedy, Michael
Defense Infrastructure: Continuing Challenges in Managing DOD Lodging Programs as Army Moves to Privatize Its Program – 122

Kerans, R J
Computational Design of UHTC Materials for Hypersonic Applications (Preprint) – 61

Kerin, Uros
Analysis of Flicker Levels in the Slovenian Transmission Network – 81

Analysis of Industrial Power Networks – 80

Power System Dynamic Security Assessment using Digital Simulation – 76

Ketkar, Nikhil S
Subdue: Compression-Based Frequent Pattern Discovery in Graph Data – 302

Khatri, Purvesh
Software Tool for Analysis of Variance of DNA Microarray Data – 163

Khorsandi, Behrooz
Post Irradiation Evaluation of Thermal Control Coatings and Solid Lubricants to Support Fission Surface Power Systems – 114

Khudanpur, Sanjeev
Cross-Lingual Lexical Triggers in Statistical Language Modeling – 244

Khurgin, Jacob B
Improved Temperature Characteristics in Quantum Dot Lasers with Indirect-Bandgap Barriers – 97

Kidwell, David A
Passive Badge Assessment for Long-Term, Low-Level Air Monitoring on Submarines: VOC Badge Validation – 44

Kim, B. J.
Method and System for Treating Contaminants and Ordors in Airborne Emissions – 138

Kim, Myung-Hee Y.
Evaluating Shielding Effectiveness for Reducing Space Radiation Cancer Risks – 334

Kim, Taeseong
Hierarchical Role-based Viewing for Multi-level Information Security in Collaborative CAD – 307

Kim, Woosung
Cross-Lingual Lexical Triggers in Statistical Language Modeling – 244

Kim, Youngjun
Modeling Dynamic Perceptual Attention in Complex Virtual Environments – 200

Kindermann, Sandra S
Analysis of fMRI Data by Blind Separation into Independent Spatial Components – 169

King, F. K.
Comparison Between H-Ion and Heat Cleaning of CU-Metal Cathodes – 269

King, Gary
LIFT - The LIsp Framework for Testing – 211

King, L.
Commissioning of the Digital LLRF for CEBAF Injector/Separator – 269

High Gradient Operation with the CEBAF Upgrade RF Control System – 268

King, Todd
MEMS Microshutter for James Webb Space Telescope – 318

King, Tracy H
Speed and Accuracy in Shallow and Deep Stochastic Parsing – 241

Kirby, B. J.
Mobile Monolithic Polymer Elements for Flow Control in Microfluidic Devices – 102

Kirby, R. E.
Comparison Between H-Ion and Heat Cleaning of CU-Metal Cathodes – 269

Kirkland, Robert
User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 208

Kirkpatrick, Richard
Overview of Engineering Design and Analysis at the NASA John C. Stennis Space Center – 22

Kitano, R.
Gravitational Gauge Mediation – 275

Kleb, Mary M.
Comparison of Satellite Observations of Nitrogen Dioxide to Surface Monitor Nitrogen Dioxide Concentration – 135

Klein, S. R.
First Results from IceCube – 323

Kletetschkar, Gunther
MEMS Microshutter for James Webb Space Telescope – 318

Klopf, J. M.
Bunch Length Measurements at the JLab FEL Using Coherent Transition and Synchrotron Radiation – 294

Knapik, Joseph J
Preliminary Derivation of Test Item Clusters for Predicting Injuries, Poor Physical Performance, and Overall Attrition in Basic Combat Training – 253

Knapp, James R
Specification for Visual Requirements of Work-Centered Software Systems – 211

Knapp, L. G.
Postsecondary Institutions in the USA: Fall 2005 and Degrees and Other Awards Conferred: 2004-05. First Look – 304

Knebel, J.
LFR Lead Cooled Fast Ractor – 270

Kneisel, P.
Investigation of Hot-Spots as a Function of Material Removal in a Large-Grain Niobium Cavity – 258

Performances of High Purity Niobium Cavities with Different Grain Sizes – 258

Knight, Kevin
Fast Decoding and Optimal Decoding for Machine Translation – 239

Training Tree Transducers – 230

Knight, Norman F., Jr.
Bearing-Load Modeling and Analysis Study for Mechanically Connected Structures – 116

Knio, Omar
Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics – 161

Knoblock, Craig A
Exploiting Secondary Sources for Unsupervised Record Linkage – 307

Ko, William L.
Incorporation of Half-Cycle Theory Into Ko Aging Theory for Aerostructural Flight-Life Predictions – 121

Kobav, Matej B.
Analysis of Flicker Levels in the Slovenian Transmission Network – 81

Kobayashi, D. M.
Lamination Cooling System Formation Methods – 90

Kobla, Vikrant
Video Summarization by Curve Simplification – 234

Koch, J. A.
High Energy X-Ray Imager for Inertial Confinment Fusion at the National Ignition Facility – 272

Multispectral X-Ray Imaging for Core Temperature and Density Maps Retrieval in Direct Drive Implosions – 272

Koch, V.
Baryon-Strangness Correlations: A Diagnostic of Strongly Interacting Matter – 273

Kochanek, Patrick M
Annual Safar Symposium (3rd) Held at University of Pittsburgh School of Medicine on 23 June 2005 – 158

Koditschek, Daniel E
Towards a Factored Analysis of Legged Locomotion Models – 229

Kohout, Lisa L.
High Altitude Long Endurance Air Vehicle Analysis of Alternatives and Technology Requirements Development – 14

Koike, Y.
Organization, Management and Function of International Space Station (ISS) Multilateral Medical Operations – 180

QT-Reummation for Polarized Semi-Inclusive Deep Inelastic Scattering – 260

Kojiro, D. R.
Titan Orbiter with Aerorover Mission (TOAM) – 319

Kolb, J. F.
Method and Device for Creating a Micro Plasma Jet – 23

Kolda, T. G.
Temporal Analysis of Social Networks Using Three-Way DEDICOM – 198

Kolka, Meg A
Forced Ventilation of Protective Garments for Hot Industries – 185

Kollias, A. C.
Graphene Layer Growth: Collision of Migrating Five-Member Rings – 52

Kolomensky, Y.
Direct Measurement of Geometric and Resistive Wakefields in Tapered Collimators for the International Linear Collider – 267

Koncan-Gradnik, Maja
Importance of Cooling System Optimization with Regard to Lifetime and Reliability of Power Transformers – 76

Konolige, Kurt
The Database as Model: A Metatheoretic Approach – 314

Kordik, Alex J
The Effect of Microphone Placement on Localization Accuracy with Electronic Pass-Through Earplugs – 284

Korkmaz, A.
Performance Comparison of Hot Rubber Crack Sealants to Emulsified Asphalt Crack Sealants – 42

Korosec, Peter
Mesh Partitioning with Ant Colonies – 76

Kos, Andrej
Softswitch Architecture Remodelling for New Generation IP Multimedia Subsystem Environment – 79

Kosir, Andrej
Is Validity of the Convolution Theorem Questionable? – 77

Kosir, Mary A
Lymphedema Prophylaxis Utilizing Perioperative Education – 159

Koss, B. A.
Apparatus for Using Optical Tweezers to Manipulate Materials – 288

Kostevc, Drago
Self-calibration on a Three-sampler Network Analyzer with Nonstandard Connectors – 212

Kotula, P.
Ultra High Temperature Ceramics for Hypersonic Vehicle Applications – 58

Koty, Patrick P
Breast Cancer Prevention by Inducing Apoptosis in DCIS Using Breast Ductal Lavage – 167

Kowalchuck, Michael
CORES - Complex Organizational Reasoning System – 216

Kozanecki, W.
Characterization of the Pep-II Colliding-Beam Phase Space by the Boost Method – 264

Monitoring of Interaction-Point Parameters Using the 3-Dimensional Luminosity Distribution Measured at Pep-II – 263

Kozeriok, Robyn
MiTPA for Real Users, Real Data, Real Problems – 307

Kozlovskaya, I. B.
Development of Training Programs to Optimize Planetary Ambulation – 179

Krader, Paul E.
Trichococcus Patagoniensis sp. nov., a Facultative Anaerobe that grows at -5 C, Isolated from Penguin Guano in Chilean Patagonia – 155

Kreiman, Gabriel
Selectivity of Local Field Potentials in Macaque Inferior Temporal Cortex – 226

Krenker, Andrej
Softswitch Architecture Remodelling for New Generation IP Multimedia Subsystem Environment – 79

Krim, Hamid
On the Distributions of Optimized Multiscale Representations – 107

Krimm, A.
The Swift/BAT Hard X-ray Survey – 321

Kripps, L. J.
Technical Basis Document for Natural Event Hazards – 136

Krishna, S.
Semiconductor Conductive Layers – 89

Krishnamoorthy, S
Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics – 161

Krishnan, G. N.
Methods and Apparatuses for Producing Metallic Compositions via Reduction of Metal Halides – 55

Krisper, Marjan
Model-driven Architecture and Its Impact on the Software Development Process – 81

Semantic Web Rule Languages – 213

Krynitsky, John A
Theoretical Considerations Governing the Dehydration of Fuels by Gas Blowing – 43

Krzywosz, K.
Combustion Turbine (CT) Hot Section Coating Life Management. (Final Report) – 60

Kubala, F
Byblos Speech Recognition Benchmark Results – 226

Kubala, Francis
Adaptation to New Microphones Using Tied-Mixture Normalization – 71

Kuchar, J.
Collision Avoidance for Unmanned Aircraft: Proving the Safety Case – 6

Kuchner, Marc
Dynamics of the DAZd Disks – 320

Kuchnir, M.
High Field Solenoid Magnets for Muon Cooling – 261

Kuhn, D. R.
Assessment of Access Control Systems – 195

Kuligowski, E. D.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Fires Prior to September 11, 2001. NIST NCSTAR 1-4A – 119

Kumar, P.
Optical Regenerative Amplifier for Binary Phase Shift-Keying Signals – 289

Kumar, S.
High Tensile Strength Carbon Nanotube Film and Process for Making the Same – 293

Macroscopic Fiber Comprising Single-Wall Carbon Nanotubes and Acrylonitrile-Based Polymer and Process for Making the Same – 46

Kumar, Sujay V.
An Integrated High Resolution Hydrometeorological Modeling Testbed using LIS and WRF – 144

Kumar, Vijay
Modeling, Analysis, Simulation, and Synthesis of Biomolecular Networks – 162

Kuo, C. C.
Vertical Beam Size Control in TLS and TPS – 275

Kuranda, Kathryn M
National Register Assessment of the Broadmoor Neighborhood, New Orleans, Orleans Parish, Louisiana – 122

Kurokawa, S.
Perfect Electrode to Suppress Secondary Electrons Inside the Magnets – 278

Kushner, Harold J
Extensions of Proportional-Fair Sharing Algorithms for Multi-Access Control of Mobile Communications: Constraints, Finite Queues and Bursty Data Processes – 72

Kutyrev, Alexander
MEMS Microshutter for James Webb Space Telescope – 318

Kuze, N
Voltage-Controlled Tunable GaAs/AlGaAs Multistack Quantum Well Infrared Detector – 108

Kwabi-Addo, Bernard
The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer – 157

Kwak, S D
Joint Synthetic Battlespace Desert Pivot Experiment (JDPE) – 211

Labadia, Catherine
Phase I Cultural Resources Survey and Archeological Inventory of a Proposed 1.12 ha (2.87 ac) Borrow Pit and an Associated Access Road, Ascension Parish, Louisiana – 126

LaBounty, Chris
Material Optimization for Heterostructure Integrated Thermionic Coolers – 298

Lacher, A.
Collision Avoidance for Unmanned Aircraft: Proving the Safety Case – 6

Lahti, G.
Commissioning of the Digital LLRF for CEBAF Injector/Separator – 269

Lai, P. C.
Fast Access, Low Memory, Pair Catalog – 1

Lai, Shu T
Reply to Comment by M. Bodeau on ‘Charging of Mirror Surfaces in Space’ – 32

Lamar, John E.
Review of Cranked-Arrow Wing Aerodynamics Project: Its International Aeronautical Community Role – 12

USM3D Unstructured Grid Solutions for CAWAPI at NASA LaRC – 13

Lambert, Winifred
Objective Lightning Probability Forecasting for Kennedy Space Center and Cape Canaveral Air Force Station – 141

Lamothe, Francois
Virtual Rapport – 218

Landa, A.
Relativistic Effects on the Equation of State of the Light Actinides – 279

Landauer, M R
Toxicological Evaluation of Depleted Uranium in Rats: Six-Month Evaluation Point – 168

Landis, Geoffrey A.
Re-Evaluating Satellite Solar Power Systems for Earth – 130

Lane, H C
Building Explainable Artificial Intelligence Systems – 223

Explainable Artificial Intelligence for Training and Tutoring – 220

Reflective Tutoring for Immersive Simulation – 220

Lane, Kim
A Comparison of the Detection Rates for Infrared and Visual Imagery of a Person Holdina an RPG – 109

Lang, John
Constellation Stretch Goals: Review of Industry Inputs – 250

Langan, T.
Reactive Materials and Thermal Spray Methods of Making Same – 56

LaPadula, Leonard J
State of the Art in Anomaly Detection and Reaction: An Update – 207

Larkey, Leah S
UMass at TREC 2002: Cross Language and Novelty Tracks – 228

Larkey, Leah
UMass at TREC 2004: Novelty and HARD – 310

Larson, Kristin
Calibrated Probabilistic Forecasting at the Stateline Wind Energy Center: The Regime-Switching Space-Time (RST) Method – 147

Larson, N. M.
Neutron Resonance Parameters of 238U and the Calculated Cross Sections from the Reich-Moore Analysis of Experimental Data in the Neutron Enrgy Range from O keV to 20 keV – 293

Lattime, Scott B.
Turbomachinery Clearance Control – 115

Lau, K. H.
Methods and Apparatuses for Producing Metallic Compositions via Reduction of Metal Halides – 55

Lauer, T. R.
Luminosity Function of Faint Globular Clusters in M87 – 324

Laurencin, C. T.
Polymeric Bioresorbable Composites Containing an Amorphous Calcium Phosphate Polymer Ceramic for Bone Repair and Replacement – 45

Lavbic, Dejan
Semantic Web Rule Languages – 213

Lavietes, A.
Performance, Thermal, and Vibration Qualification Testing of Zetec Acoustic Transducers, Model Z0002659-2, Sondicator Probes – 282

Lazos, Loukas
Cross-Layer Design for Energy-Efficient Secure Multicast Communications in Ad Hoc Networks – 132

Secure Broadcast in Energy-Aware Wireless Sensor Networks – 131

VP3: Using Vertex Path and Power Proximity for Energy Efficient Key Distribution – 131

Leal, L. C.
Neutron Resonance Parameters of 238U and the Calculated Cross Sections from the Reich-Moore Analysis of Experimental Data in the Neutron Enrgy Range from O keV to 20 keV – 293

Learned, Rachel E
A Wavelet Packet Approach to Transient Signal Classification – 283

LeBlanc, Adrian
Natural Calcium Isotopic Composition of Urine as a Marker of Bone Mineral Balance – 155

LeBoeuf, S. F.
Gallium Nitride Crystals and Wafers and Method of Making – 264

Leclerc, Y G
Object-Centered Surface Reconstruction: Combining Multi-Image Stereo and Shading – 227

Leclerc, Yvan G
Registration without Correspondences – 227

Using 3-Dimensional Meshes to Combine Image-Based and Geometry Constraints – 228

Ledvina, S. A.
Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

Lee, Chung P.
Runtime and Pressurization Analyses of Propellant Tanks – 36

Lee, D. C.
Northwest Forest Plan-The First 10 Years (1994-2003): Synthesis of Monitoring and Research Results – 136

Lee, Jina
Nonverbal Behavior Generator for Embodied Conversational Agents – 204

Lee, Jooyoung
A Set-Covering Approach for Modeling Attacks on Key Predistribution in Wireless Sensor Networks – 214

Lee, Lim T
Cross-Layer Design and Optimization for Wireless Sensor Networks – 73

Lee, M. Y.
Phase Transformation of ‘Chem-prep’ PZT 95/5-2Nb HF 1035 Ceramic Under Quasi-static Loading Conditions – 60

Lee, R. S.
Method of Defining Features on Materials with a Femtosecond Laser – 288

Lehman, S. K.
Phase Effects on Mesoscale Object X-ray Attenuation Radiographs – 259

Wave Based Inversion and Imaging for the Optical Quadrature Microscope – 290

Leibowitz, Lawrence M
Delta-Sigma UHF Digital Waveform Generator – 280

Lemke, Andreas
Enhancing Incremental Learning Processes With Knowledge-Based Systems – 312

Lenane, Kate
Defense Infrastructure: Continuing Challenges in Managing DOD Lodging Programs as Army Moves to Privatize Its Program – 122

Leng, Theodore
Bucky Paper as a Support Membrane in Retinal Cell Transplantation – 149

Lent, E.
How Accurately Can We Calculate Neutrons Slowing Down in Water – 271

Leo, D.
Ionic Solvents Used in Ionic Polymer Transducers, Sensors and Actuators – 41

Lerman, David J
Evaluation of the Modular Semi-Automated Force Air Entity Simulation – 11

Leske, R. A.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Lester, W. A.
Graphene Layer Growth: Collision of Migrating Five-Member Rings – 52

Leuski, Anton
Dealing with Out of Domain Questions in Virtual Characters – 219

Leuttgen, Mark R
Optical Flow Computation via Multiscale Regularization – 98

Leven, Bernd
Energy Assessment Strategy and Energy Concepts for Industrial Facilities – 135

Levin, G A
Magnetization Losses in Multifilament Coated Superconductors (Postprint) – 280

Levis, Alexander H
Modeling the Interacting Decision Maker with Bounded Rationality – 251
On the Design of Information-Processing and Decisionmaking Organizations – 251

Levy, Bernard C
Inversion of Generalized Parabolic Projections – 235
Layer by Layer Reconstruction Methods for the Earth Resistivity from Direct Current Measurements – 236
Simultaneous Inversion of Velocity and Density Profiles – 236

Lew, H. S.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Design, Construction, and Maintenance of Structural and Life Safety Systems. NIST NCSTAR 1-1 – 299

Lewandowski, A.
Trough Receiver Heat Loss Testing – 129

Lewis, Clayton
NoPumpG: Creating Interactive Graphics With Spreadsheet Machinery – 209

Lezec, Henri
E-MRS Spring Meeting - Nanophotonic Materials Session – 97

Li, Bao-hui
Protection Effects of a New Combined Anti-G Measure – 174

Li, C
Measured Effects of a Narrowband Interference Suppressor on GPS Receivers – 99

Li, D.
All-Optical Controllable Photonic Switch – 290
Muon Cooling RF R and D Program – 277

Li, K.
Metamaterial Scanning Lens Antenna Systems and Methods – 70

Li, Li-hua
Protection Effects of a New Combined Anti-G Measure – 174

Li, Mary J.
MEMS Microshutter for James Webb Space Telescope – 318

Li, Mingyan
CARAVAN: Providing Location Privacy for VANET – 68

Li, Qian
Protection Effects of a New Combined Anti-G Measure – 174

Li, Qi
UMass at TREC 2003: HARD and QA – 312

Li, R.
Fast Access, Low Memory, Pair Catalog – 1

Li, Ruo-xin
Design of a Wearable Respiratory Inductive Plethysmograph and Its Applications – 178

Li, Wei
Information Extraction Supported Question Answering – 309

Li, Xiaoyan
UMass at TREC 2004: Novelty and HARD – 310

Li, Y. T.
Evaluation of TCP Congestion Control Algorithms on the Windows Vista Platform – 263

Li, Yi-feng
Protection Effects of a New Combined Anti-G Measure – 174

Li, Yin-xia
Study on Modified Delphi Method as Used for Index Filtration in Ergonomic Evaluation of Cockpit Display – 176

Lian, T.
Comparative Corrosion Behavior of Two Palladium-Containing Titanium Alloys – 50

Liang, X.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of Building Code Structural Requirements. NIST NCSTAR 1-1B – 117

Liang, Zhong-gang
Research on ECG Denoising during Spaceflight – 177

Liao, Z. M.
Initial Demonstration of Mercury Wavefront Correction System – 287

Liemohn, M. W.
Origin and Evolution of Deep Plasmaspheric Notches – 326

Liewer, Matt
A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Lijowski, M.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Lillard, R. P.
Assessment of Turbulent Shock-Boundary Layer Interaction Computations Using the OVERFLOW Code – 101

Lilly, Craig M
Software Tool for Analysis of Variance of DNA Microarray Data – 163

Lima, Jr , I T
Analysis of PMD Compensators With Fixed DGD Using Importance Sampling – 98

Lin, D.
High-Throughput Methods for Determining Electron Density Distributions and Structures of Crystals – 42

Lin, John C.
High-Lift System for a Supercritical Airfoil: Simplified by Active Flow Control – 14

Lindheim, R
Simulation Meets Hollywood: Integrating Graphics, Sound, Story and Character for Immersive Simulation – 200

Lindsey, Brian W
MAFFS and Military Support to Civil Authority: A Case Study in Command and Control – 72

Lingbloom, Mike
Laser Shearography Inspection of TPS (Thermal Protection System) Cork on RSRM (Reusable Solid Rocket Motors) – 115

Lingenfelser, Gretchen
Comparison of Satellite Observations of Nitrogen Dioxide to Surface Monitor Nitrogen Dioxide Concentration – 135

Litvinenko, V. N.
Cooling Force Measurement in CELSIUS – 274

Liu, Hong
Development of Controlled Ecological Life-support System in Russia – 176

Liu, T.
High Tensile Strength Carbon Nanotube Film and Process for Making the Same – 293

Liu, Xiang-yang
Development of a Complex Experimental System for Studies of Controlled Ecological Life Support Technique – 175

Liu, Xiaoyong
UMass at TREC 2003: HARD and QA – 312

Liu, Xuedong
Identification of the Downstream Promoter Targets of Smad Tumor Suppressors in Human Breast Cancer Cells – 160

Liu, Xu-feng
Effects of Microgravity on Human Spatial Orientation in Space Flight – 175

Liu, Z. J.
High-Throughput Methods for Determining Electron Density Distributions and Structures of Crystals – 42

Livstone, M M
A Hierarchical Algorithm for Neural Training and Control. Revision – 236

Locci, Ivan E.
High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems – 57

Loehman, R.
Ultra High Temperature Ceramics for Hypersonic Vehicle Applications – 58

Lofnes, T.
Cooling Force Measurement in CELSIUS – 274

Loftus, David J.
Bucky Paper as a Support Membrane in Retinal Cell Transplantation – 149

Lok, Larry
Methods, Knowledge Support, and Experimental Tools for Modeling – 209

Londer, H.
New High Capacity Getter for Vacuum Insulated Mobile Liquid Hydrogen Storage Systems – 105

Long, Eric J
Cost Valuation: A Model for Comparing Dissimilar Aircraft Platforms – 18

Loomis, Mark
Arcjet Semi-Elliptic Nozzle Simulations and Validation in Support of TPS Testing – 101

Lorenzini, Enrico
Electrodynamic Tether – 32

Lou, Sheldon X
Conditions for Scale-Based Decompositions in Singularly Perturbed Systems – 240

Lou, Xi-Cheng
Optimally Robust Redundancy Relations for Failure Detection in Uncertain Systems – 216

Lowe, Stephen
Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

Lowndes, D. H.
Vertically Aligned Nanostructure Scanning Probe Microscope Tips – 41

Lu, Yao-feng
Space Medicine and Medical Engineering, Volume 19, No. 5 – 174

Luecke, W. E.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Contemporaneous Structural Steel Specifications. NIST NCSTAR 1-3A – 120

Luetke, Nathan J.
A Dynamic/Anisotropic Low Earth Orbit (LEO) Ionizing Radiation Model – 334

Luettgen, M R
Multiscale Representations of Markov Random Fields – 243

Luettgen, Mark R
Efficient Multiscale Regularization with Applications to the Computation of Optical Flow – 106

Multiscale Representations of Markov Random Fields – 247

Luhman, J. G.
Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

Luigi, Donat-Pierre
Development of a Data Management Tool for Investigating Multivariate Space and Free Will Experiences in Virtual Reality – 201

The Fidelity of ‘Feel’: Emotional Affordance in Virtual Environments – 203

Lulue, D
Using Human Systems Integration and Knowledge Engineering to Define and Design Anti-Terrorism/Force Protection Systems and Solutions – 183

Lundquist, J. K.
Study of Stability Conditions in an Urban Area – 139

Lynch, Barney
MEMS Microshutter for James Webb Space Telescope – 318

Lyrintzis, A. S.
Assessment of Turbulent Shock-Boundary Layer Interaction Computations Using the OVERFLOW Code – 101

Ma, C. W.
Resistance of HEPA Filters in a Ventilation Duct on Leakpath Factor Calcuations – 137

Ma, Jin
Effects of Tail Suspension on Renin-angiotensin System in Rat Myocardium – 176

Maartense, I
Effect of O2 Partial Pressure on YBa2Cu3O7-delta Thin Film Growth by Pulsed Laser Deposition – 54

Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint) – 61

MacFarlane, R.
How Accurately Can We Calculate Neutrons Slowing Down in Water – 271

Mack, Daniel R
A Comparison of the Navy and the Air Force Budgeting and Execution Process for Aviation Fuel (AVFUEL) – 64

MacPherson, C. D.
Electronic Device and Process for Forming Same – 90

Madsen, C.
NASA CEV Reference Entry GN&C System and Analysis – 21

Madsen, Jennifer M.
Crew Exploration Vehicle Ascent Abort Coverage Analysis – 31

Maghami, P. G.
Control of the ST7 Disturbance Reduction System Flight Experiment – 34

Magnotti, Gaetano
Development of Supersonic Combustion Experiments for CFD Modeling – 105

Mahaffey, P
Titan Orbiter with Aerorover Mission (TOAM) – 319

Mahon, C. H.
Zeeman Tuning Rates in the v3 Band of NO2 – 110

Mailloux, Robert J
A Low-Sidelobe Partially Overlapped Constrained Feed Network for Time-Delayed Subarrays – 99

Majumdar, Arunava
Simulation of Biomolecular Nanomechanical Systems – 160

Majumder, A.
Baryon-Strangness Correlations: A Diagnostic of Strongly Interacting Matter – 273

Makeig, Scott
Analysis of fMRI Data by Blind Separation into Independent Spatial Components – 169

Makhoul, J
Byblos Speech Recognition Benchmark Results – 226

Continuous Speech Recognition Using Segmental Neural Nets – 74

Improving State-of-the-Art Continuous Speech Recognition System Using the N-Best Paradigm with Neural Networks – 74

Makhoul, John
Adaptation to New Microphones Using Tied-Mixture Normalization – 71

Malin, Bradley
Preserving Privacy by De-identifying Facial Images – 73

Malladi, Sreekanth
How to Prevent Type-Flaw Guessing Attacks on Password Protocols – 215

Mallela, J.
Advanced Quality Systems: Guidelines for Establishing and Maintaining Construction Quality Databases – 303

Mallery, Ellen
Intelligent Agents for Computer-Generated Forces – 9

Mallick, Kaushik
Effect of Inclusion Morphology on the Coefficient of Thermal Expansion in Filled Epoxy Matrix (Preprint) – 47

Malloy, M A
XML-Native Constraint Evaluation – 253

Malone, Patrick K
Developing an Inflatable Solar Array – 31

Managan, R. A.
CALE EOS Form 2 Fits for High Pressure Fused Silica Hugoniot Data – 39

Mancini, R. C.
Multispectral X-Ray Imaging for Core Temperature and Density Maps Retrieval in Direct Drive Implosions – 272

Manning, Carol A
Complexity and Automation Displays of Air Traffic Control: Literature Review and Analysis – 11

Manoosingh, L. L.
Chemical Agent Detector – 139

Mao, W.
Efficient Subtorus Processor Allocation in a Multi-Dimensional Torus – 197

Mao, Wenji
Evaluating a Computational Model of Social Causality and Responsibility – 254

Evaluating Social Causality and Responsibility Models: An Initial Report – 222

Mitigation Theory: An Integrated Approach – 249

Marcu, Daniel
Fast Decoding and Optimal Decoding for Machine Translation – 239

Mariano, R. J.
EM Threat Analysis for Wireless Systems – 71

Mariano, R.
Hardware-in-the-Loop Testing of Wireless Systems in Realistic Environments – 70

Marks, B S
Analysis of PMD Compensators With Fixed DGD Using Importance Sampling – 98

Markwardt, C. B.
GRO J1655-40: Early Stages of the 2005 Outburst – 320

The Swift/BAT Hard X-ray Survey – 321

Marsella, S
Simulation Meets Hollywood: Integrating Graphics, Sound, Story and Character for Immersive Simulation – 200

Marsella, Stacey
Nonverbal Behavior Generator for Embodied Conversational Agents – 204

Marsella, Stacy
Evaluating a Computational Model of Emotion – 233

Mitigation Theory: An Integrated Approach – 249

Toward a New Generation of Virtual Humans for Interactive Experiences – 205

Virtual Rapport – 218

Marsic, Damien
Trichococcus Patagoniensis sp. nov., a Facultative Anaerobe that grows at -5 C, Isolated from Penguin Guano in Chilean Patagonia – 155

Martin, Corby
Weight Measurements and Standards for Soldiers – 165

Martin, J. R.
Northwest Forest Plan-The First 10 Years (1994-2003): Synthesis of Monitoring and Research Results – 136

Martin, Jennifer L
Analyzing the Structure of Air Force Space Acquisitions – 29

Martin, S. I.
Methods to Calculate Corrosion Rates for Alloy 22 from Polarization Resistance Experiments – 49

Martin, Steve
Characterization and Modeling of Bonded Piezoelectric Sensor Performance and Durability in Simulated Aircraft Environments (Preprint) – 17

Martinovski, Bilyana
Mitigation Theory: An Integrated Approach – 249

Martinovsky, Bilyana
Cognitive and Emotive Empathy in Discourse: Towards an Integrated Theory of Mind – 221

Martinsson, Per-Gunnar
On Interpolation and Integration in Finite-Dimensional Spaces of Bounded Functions – 233

Martz, H. E.
Analysis Procedures for Double-Shell Target Concentricity and Wall Thickness – 271

Phase Effects on Mesoscale Object X-ray Attenuation Radiographs – 259

Marusich, R. M.
Action Concentration for Mixtures of VOCs, Methane and Hydrogen – 50

Maruyama, T.
Comparison of 2 mrad and 14/20 mrad Crossing Angle Extraction Lines – 296

Masek, E
XML-Native Constraint Evaluation – 253

Massey, Steven J.
Three-Dimensional Computational Model for Flow in an Over-Expanded Nozzle With Porous Surfaces – 1

Mastorides, T.
Amplitude Linearizers for PEP-II 1.2 MW Klystrons and LLRF Systems – 294

Mathews, Christopher K
DNA Precursor Metabolism and Mitochondrial Genome Stability – 173

Mathieu, Charlotte
Fractionated Spacecraft Architectures Seeding Study – 30

Matsuura, Kanta
CARAVAN: Providing Location Privacy for VANET – 68

Mattson, Jeff
Defense in Depth: Foundation for Secure and Resilient IT Enterprises – 218

Matvos, Dejan
Analysis of Flicker Levels in the Slovenian Transmission Network – 81

Maucec, Mirjam Sepesy
Statistical Alignment Models in Machine Translation from Slovenian to English – 186

Maxwell, George L
Molecular Biology and Prevention of Endometrial Cancer – 170

Maxwell, III, John T
Speed and Accuracy in Shallow and Deep Stochastic Parsing – 241

May, Christopher J
Defense in Depth: Foundation for Secure and Resilient IT Enterprises – 218

May, J.
High Precision SC Cavity Diagnostics with Hom Measurements – 266

Mayr, Hans G.
Modeling the Observed Solar Cycle Variations of the Quasi-biennial Oscillation (QBO): Amplification by Wave Forcing – 144

McBeth, Michael S
Risk Driven Outcome-Based Command and Control (C2) Assessment – 66

McCallister, E.
Personal Identity Verification Demonstration Summary – 195

McClelland, James
Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative – 311

McCormick, D.
High Precision SC Cavity Diagnostics with Hom Measurements – 266

McCurdy, C.
Using Pin as a Memory Reference Generator for Multiprocessor Simulation – 191

McDonald, K.
Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

McGrattan, K. B.
Fire Dynamics Simulation (Version 2): Technical Reference Guide – 103

Fire Dynamics Simulator (Version 3) User's Guide – 103

McKeever, J. W.
Real Time Flux Control in PM Motors – 84

McKeirnan, R. D.
Recuperator Assembly and Procedures – 23

Mckenzie, Jennifer
Mass Properties and Inertial Loading Effects of Head Encumbering Devices – 181

McKeown, Martin J
Analysis of fMRI Data by Blind Separation into Independent Spatial Components – 169

McKnight, T. E.
Automation & Characterization of US Air Force Bench Top Wind Tuunnels. Summary Report – 26

McPherson, Terry R.
Extending NASA Research Results to Benefit Society: Rapid Prototyping for Coastal Applications – 126

Meadows, M. A.
Time-Lapse Seismic Modeling and Inversion Modeling and Inversion of CO2 Saturation for Sequestration and Enhanced Oil Recovery – 135

Meeus, Jean
Five Millennium Canon of Solar Eclipses: -1999 to +3000 (2000 BCE to 3000 CE) – 319

Meier, D. A.
Phase Transformation of ‘Chem-prep’ PZT 95/5-2Nb HF 1035 Ceramic Under Quasi-static Loading Conditions – 60

Meinhart, Carl
Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics – 161

Meitzler, Thomas J
A Comparison of Mamdani and Sugeno Methods for Modeling Visual Perception Lab Data – 252

Meitzler, Tom
A Comparison of the Detection Rates for Infrared and Visual Imagery of a Person Holdina an RPG – 109

Mejos, Terence N
Process Improvement at the Aircraft Intermediate Maintenance Detachment (AIMD) at Naval Air Station Whidbey Island – 5

Mekkes, G. L.
Test Capability Enhancements to the NASA Langley 8-Foot High Temperature Tunnel – 26

Meldrum, AnnMarie
A Ground Vehicle Simulation Design to Study Driver Display Concepts – 64

Melechko, A. V.
Vertically Aligned Nanostructure Scanning Probe Microscope Tips – 41

Melnitchouk, W.
Jefferson Lab Phenomenology: Selected Highlights – 277

Melton, B. J.
Biological Restoration of Major Transportation Facilities Domestic Demonstration and Application Project (DDAP): Technology Develop(ment aat Sandia National Laboratories – 60

Melton, LaTunia Pack
High-Lift System for a Supercritical Airfoil: Simplified by Active Flow Control – 14

Mengel, John G.
Modeling the Observed Solar Cycle Variations of the Quasi-biennial Oscillation (QBO): Amplification by Wave Forcing – 144

Menges, W.
Measurement of the CKM Matrix Element Vcb and Vub at the B-Factories – 259

Menyuk, C R
Analysis of PMD Compensators With Fixed DGD Using Importance Sampling – 98

Menyuk, Curtis R
Dispersion Management in a Harmonically Mode-Locked Fiber Soliton Laser – 111

Merklov, V. I.
Vertically Aligned Nanostructure Scanning Probe Microscope Tips – 41

Meshkov, I. N.
Summary of Beam Cooling and Intrabeam Scattering – 261

Messer, Tim
Dynamic IR Scene Projector Based Upon the Digital Micromirror Device – 74

Mewaldt, R. A.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Meyer, J. A.
Nanotube Composites and Methods for Producing – 46

Miao, Dan-min
Effects of Microgravity on Human Spatial Orientation in Space Flight – 175

Michalowski, Martin
Exploiting Secondary Sources for Unsupervised Record Linkage – 307

Mihalic, Rafael
Possibilities and Limitations of Electric Power Transmission Over Long Distances Part 2 - Long distance AC transmission – 78

Possibilities and Limitations of Electric Power Transmission Over Long Distances – 80

Milam, D
Emotionally Evocative Environments for Training – 212

Miller, C. A.
Development of Training Programs to Optimize Planetary Ambulation – 179

Locomotor Dysfunction after Spaceflight: Characterization and Countermeasure Development – 151

Miller, Christopher A.
Effects of Speed and Visual-Target Distance on Toe Trajectory During the Swing Phase of Treadmill Walking – 157

Miller, E.
Postsecondary Institutions in the USA: Fall 2005 and Degrees and Other Awards Conferred: 2004-05. First Look – 304

Miller, R
Virtual Design and Testing of Materials: A Multiscale Approach – 40

Miller, Richard L.
Extending NASA Research Results to Benefit Society: Rapid Prototyping for Coastal Applications – 126

Miller, Ron
Energy and Utilities Readiness for the Army Industrial Activities – 133

Miller, Suzanne M
Facilitating Treatment Decision Making, Adjustment, and Coping in Men Newly Diagnosed with Prostate Cancer. Addendum – 164

Millis, Marc G.
Responding to Mechanical Antigravity – 37

Mills, Janelle C.
A Simplified Approach for the Rapid Generation of Transient Heat-Shield Environments – 34

Mincheff, Milcho
Naked DNA Immunization of Prevention of Prostate Cancer in a Dunning Rat Prostate Tumor Model – 172

Minow, Joseph I.
Radiation and Plasma Environments for Lunar Missions – 333

Miraglia, D
Emotionally Evocative Environments for Training – 212

Miranda, Cristina M
A Critical Analysis of the Acquisition Review Journal: Are We in Step with the Field? – 314

Mitchell, M.
LLNL Heavy Element Facility-Facility Management, Authorization Basis, and Readiness Assessment Lessons Learned in the Heavy Element Facility (B251) Transition from Category II Nuclear Facility to Radiological Facility – 137

Mitchell, R. L.
Accelerating PV Cost Effectiveness Through Systems Design, Engineering, and Quality Assurance. Phase 1 Annual Technical Report, November 4, 2004-November 3, 2005 – 129

Mitter, Sanjoy K
Lattice Approximation in the Stochastic Quantization of (04)2 Fields – 237

Simulated Annealing Type Algorithms for Multivariate Optimization – 248

Miyoshi, Kazuhisa
Application of Carbon Based Nano-Materials to Aeronautics and Space Lubrication – 113

Mlakar, Joze
Self-calibration on a Three-sampler Network Analyzer with Nonstandard Connectors – 212

Mo, Yin-Yuan
Dysregulation of RNA Interference in Breast Cancer – 167

Modha, Dharmendra S
Fully Automatic Cross-Associations – 302

Modi, Mitul
Live Modeling of a Dyna Vision SPR-02 Sensor for Rangefinding Application – 110

Moffeit, K.
Comparison of 2 mrad and 14/20 mrad Crossing Angle Extraction Lines – 296

Mohamadzadeh, Mansour
Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 164

Mohamed, A. A. H.
Method and Device for Creating a Micro Plasma Jet – 23

Mohri, Mehryar
A Unified Construction of the Glushkov, Follow, and Antimirov Automata – 219

Mokeev, V. I.
Nucleon resonance studies in phenomenological analysis of the CLAS data on double charged pion photo and electroproduction – 268

Molloy, S.
High Precision SC Cavity Diagnostics with Hom Measurements – 266

Monk, Peter B
The Inverse Source Problem for Maxwell's Equations – 231

Montgomery, S. T.
Phase Transformation of 'Chem-prep' PZT 95/5-2Nb HF 1035 Ceramic Under Quasi-static Loading Conditions – 60

Moody, L
Fully Virulent Bacillus Anthracis Does Not Require the Immunodominant Protein BclA for Pathogenesis – 164

Moore, K. A.
Structures Including Network and Topology for Identifying, Locating and Quantifying Physical Phenomena – 39

Moore, Robert C
A Formal Theory of Knowledge and Action – 222

Morales, Mathieu
Virtual Rapport – 218

Moran, Gary
Simulation Activities Using Gateway and Tactical Digital Information Links – 73

Morency, Louis-Philippe
Virtual Rapport – 218

Moretti, A.
Muon Cooling RF R and D Program – 277

Moriarty, M. P.
Technology Development Program for an Advanced Potassium Rankine Power Conversion System Compatible with Several Space Reactor Designs – 27

Morie, J F
Emotionally Evocative Environments for Training – 212

Morie, Jacquelyn F
Development of a Data Management Tool for Investigating Multivariate Space and Free Will Experiences in Virtual Reality – 201

Human Emotional State and its Relevance for Military VR Training – 202

The Fidelity of 'Feel': Emotional Affordance in Virtual Environments – 203

Morris, Jonathan
Sensor Networking Testbed with IEEE 1451 Compatibility and Network Performance Monitoring – 213

Morrison, Joseph H.
Statistical Analysis of CFD Solutions from the Third AIAA Drag Prediction Workshop – 243

Moseley, Harvey
MEMS Microshutter for James Webb Space Telescope – 318

Moskalenko, I. V.
Inverse Compton Emission from Galactic Supernova Remnants: Effect of the Interstellar Radiation Field – 322

Inverse Compton Scattering on Solar Photons, Heliospheric Modulation, and Neutrino Astrophysics – 322

Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Moti, S.
LFR Lead Cooled Fast Ractor – 270

Mott, Brent
MEMS Microshutter for James Webb Space Telescope – 318

Moulin, D
Measured Effects of a Narrowband Interference Suppressor on GPS Receivers – 99

Mozurkewich, Dave
Design Considerations for the Second-Generation NPOI Fringe Tracker and Science Beam Combiner – 292

Mughabghab, S. F.
Nuclear Reaction and Structure Databases of the National Nuclear Data Center – 323

Mukherjee, Sayan
Bagging Regularizes – 246

Risk Bounds for Mixture Density Estimation – 246

Statistical Learning: Stability is Sufficient for Generalization and Necessary and Sufficient for Consistency of Empirical Risk Minimization – 256

Mulavara, A. P.
A Hypothetical Perspective on the Relative Contributions of Strategic and Adaptive Control Mechanisms in Plastic Recalibration of Locomotor Heading Direction – 155

Development of Training Programs to Optimize Planetary Ambulation – 179

Locomotor Dysfunction after Spaceflight: Characterization and Countermeasure Development – 151

Mun, Jonathan
A Methodology for Improving the Shipyard Planning Process: Using KVA Analysis, Risk Simulation and Strategic Real Options – 100

Munday, S.
NASA CEV Reference Entry GN&C System and Analysis – 21

Munoz, Cesar
A High-Level Formalization of Floating-Point Number in PVS – 204

Muratore, C
Molybdenum Disulfide as a Lubricant And Catalyst in Adaptive Nanocomposite Coatings (Preprint) – 53

Murphy, J
Effect of O2 Partial Pressure on YBa2Cu3O7-delta Thin Film Growth by Pulsed Laser Deposition – 54

Murphy, R. W.
Technology Development Program for an Advanced Potassium Rankine Power Conversion System Compatible with Several Space Reactor Designs – 27

Murtha, Jack
Joint Synthetic Battlespace Desert Pivot Experiment (JDPE) – 211

Muscet, Marinko
Development of multi service provisioning platform in synchronous digital hierarchy systems – 199

Mushotzky, R. F.
The Swift/BAT Hard X-ray Survey – 321

Muza, Stephen R
Validation of a Shortened Electronic Version of the Environmental Symptoms Questionnaire – 160

Myers, Brad A
The Case for an Open Data Model – 201

Myers, Karen
A Personalized Calendar Assistant – 311

Myers, T. L.
FY 2005 Quantum Cascade Laser Alignment System. Final Report – 289

Myneni, G. R.
New High Capacity Getter for Vacuum Insulated Mobile Liquid Hydrogen Storage Systems – 105
Performances of High Purity Niobium Cavities with Different Grain Sizes – 258

Myszka, David G
Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics – 161

Nagashima, J.
QT-Reummation for Polarized Semi-Inclusive Deep Inelastic Scattering – 260

Najm, Habib
Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics – 161

Nakamura-Messenger, Keiko
In-situ micro-FTIR Study of Thermal Changes of Organics in Tagish Lake Meteorite: Behavior of Aliphatic Oxygenated Functions and Effects of Minerals – 328

Nakanishi, T.
Comparative Corrosion Behavior of Two Palladium-Containing Titanium Alloys – 50

Nakashima, Satoru
In-situ micro-FTIR Study of Thermal Changes of Organics in Tagish Lake Meteorite: Behavior of Aliphatic Oxygenated Functions and Effects of Minerals – 328

Nakayama, T.
Comparative Corrosion Behavior of Two Palladium-Containing Titanium Alloys – 50

Nan, Z.
Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions – 143

Napoli, J.
Architecture for Rendering Graphics on Output Devices Over Diverse Connections – 305

Narang, K. J.
Gallium Nitride Crystals and Wafers and Method of Making – 264

Narayanan, Srini
Question Answering Based on Semantic Structures – 301

Narvid, Juan C
Tanker-Force Structure: Recapitalization of the KC-135 – 15

Nathal, Michael V.
Development of GRCop-84 for Rocket Engine Applications – 56

Nealy, John E.
A Dynamic/Anisotropic Low Earth Orbit (LEO) Ionizing Radiation Model – 334

Nedeljkovic, David
Modulation in Stator Flux Control of Induction Motor for Reduced Torque Ripple – 77

Needelman, D. D.
Fast Access, Low Memory, Pair Catalog – 1

Needleman, A
Virtual Design and Testing of Materials: A Multiscale Approach – 40

Negres, R. A.
Different Precursor Populations Revealed by Microsciouc Studies of Bulk Damage in KDP and DKDP Crystals – 43
Multi Dimensional Investigation of Laser Conditioning in KDP and DKDP Crystals – 290

Neil, Doreen O.
Comparison of Satellite Observations of Nitrogen Dioxide to Surface Monitor Nitrogen Dioxide Concentration – 135

Neil, G.
Bunch Length Measurements at the JLab FEL Using Coherent Transition and Synchrotron Radiation – 294

Nelson, C. V.
Digital Nulling Pulse Inductive Metal Detector – 91
Step Current Inductive Antenna for Pulse Inductive Metal Detector – 91

Nelson, J. A.
Metamaterial Scanning Lens Antenna Systems and Methods – 70

Nelson, K. A.
Characterization of Materials with Optically Shaped Acoustic Waveforms – 272

Nemec, Mitja
Modulation in Stator Flux Control of Induction Motor for Reduced Torque Ripple – 77

Nesbitt, James A.
High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems – 57

Ness, Norm
Trains of Magnetic Holes and Magnetic Humps in the Heliosheath – 325

Neumayer, P. B.
Solid-Density Plasma Characterization with X-Ray Scattering on the 200-J Janus Laser – 271

Neumeyer, Leonardo
Microphone-Independent Robust Signal Processing Using Probabilistic Optimum Filtering – 241

Newman, John
Laser Shearography Inspection of TPS (Thermal Protection System) Cork on RSRM (Reusable Solid Rocket Motors) – 115

Newton, Elaine
Preserving Privacy by De-identifying Facial Images – 73

Newton, Jr , Robert
Weight Measurements and Standards for Soldiers – 165

Newton, Michael A
Easy Estimation of Normalizing Constants and Bayes Factors from Posterior Simulation: Stabilizing the Harmonic Mean Estimator – 246

Ng, E.
High Energy X-Ray Imager for Inertial Confinment Fusion at the National Ignition Facility – 272

Nguyen, H. T.
Gratings for High Energy Petawatt Lasers – 279

Nguyen, Long
Is N-Best Dead? – 241

Nichols, J M
Intensity Analysis of Recurrence Plots for the Detection of Deterministic Signals in Noise – 246

Nickol, Craig L.
High Altitude Long Endurance Air Vehicle Analysis of Alternatives and Technology Requirements Development – 14

Nieper-Lemke, Helga
Enhancing Incremental Learning Processes With Knowledge-Based Systems – 312

Nishida, Toshikaza
MEMS Based Acoustic Array – 281

Nishimura, H.
Particle Tracking and Simulation on the .NET Framework – 272

Nissen, J. D.
Gratings for High Energy Petawatt Lasers – 279

Nitz, Ken
A Personalized Calendar Assistant – 311

Niyogi, Partha
Statistical Learning: Stability is Sufficient for Generalization and Necessary and Sufficient for Consistency of Empirical Risk Minimization – 256

Norem, J.
Muon Cooling RF R and D Program – 277

Nosochkov, Y.
Comparison of 2 mrad and 14/20 mrad Crossing Angle Extraction Lines – 296
SABER Optical Design – 264

Nothwang, WIlliam D
Numerical Methods for Analysis of Charged Vacancy Diffusion in Dielectric Solids – 95

Nullmeyer, Robert T
Human Factors Evaluation of the Aerial Gunner Scanner Simulator – 8

Nunez-Neto, Blas
Border Security: Barriers Along the U.S. International Border – 116

Nuss-Warren, S. R.
Cost-Effective Reciprocating Engine Emissions Control and Monitoring for E&P Field and Gatherings Engines. Report 14. Technical Report, April 1, 2006-June 30, 2006 – 114

Nyquist, L. E.
Rb-Sr and Sm-Nd Isotopic Studies of Martian Depleted Shergottes SaU 094/005 – 327

Sm-Nd and Rb-Sr Ages for MIL 05035: Implications for Surface and Mantle Sources – 331

Sm-Nd Isotopic Systematics of Troctolite 76335 – 330

Nystroem, K.
Positionering av Radiosaendare i Svar Radionmiljoe (Radio DF in Difficult Environment) – 68

Oates, Tim
Two Algorithms for Learning the Parameters of Stochastic Context-Free Grammars – 239

Oates, Tom
Estimating Grammar Parameters using Bounded Memory – 239

Obara, Clifford J.
Review of Cranked-Arrow Wing Aerodynamics Project: Its International Aeronautical Community Role – 12

Oberkampf, W. L.
Verification Test Problems for the Calculation of Probability of Loss of Assured Safety in Temperature-Dependent Systems with Multiple Weak and Strong Links – 190

Oblozinsky, P.
Nuclear Reaction and Structure Databases of the National Nuclear Data Center – 323

O'Brien, David K
Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 164

O'Brien, John
Direct Measurement of Population-Induced Broadening of Quantum Well Intersubband Transitions – 284

O'Connell, Michael H
ARN II Program, Final Technical Report – 218

ODonnell, J. R., Jr.
Control of the ST7 Disturbance Reduction System Flight Experiment – 34

Oebek, Ali
Inversion of Generalized Parabolic Projections – 235

Oehler, D. Z.
Layered Sediments, Rampart Craters, and Potential Fluvio-Lacustrine Activity in S.W. Arabia Terra, Mars: Support for a History of Aqueous Conditions – 332

Ogden, Fred L
Unsteady Storm Drainage Modeling Within the U.S. Army Corps of Engineers GSSHA Model – 106

O'Grady, C.
Monitoring of Interaction-Point Parameters Using the 3-Dimensional Luminosity Distribution Measured at Pep-II – 263

Oh, Lance
MEMS Microshutter for James Webb Space Telescope – 318

Oide, K.
Space Charge and Equilibrium Emittances in Damping Rings – 273

Okhmatovskaia, Anna
Virtual Rapport – 218

Okurowski, Mary E
Tasks, Domains, and Languages – 308

Oliver, A. B.
Assessment of Turbulent Shock-Boundary Layer Interaction Computations Using the OVERFLOW Code – 101

Olivier, S.
AO Group Annual Report – 320

Olson, Carl T
A Medical Research and Evaluation Facility (MREF) and Studies Supporting the Medical Chemical Defense Program – 167

Oman, Paul W
Implementation-Oriented Secure Architectures – 214

Onyshkevych, Boyan
Tasks, Domains, and Languages – 308

OPilver, S.
MEMS Actuated Deformable Mirror – 259

Orlin, James B
Parallel Algorithms for the Assignment and Minimum-Cost Flow Problems – 252

Orphal, D.
Survey of the Hypervelocity Impact Technology and Applications – 28

Ortiz, M
Virtual Design and Testing of Materials: A Multiscale Approach – 40

Ortiz, Sean C
High Power Spatial Combiners: Tile and Tray Approaches – 99

Ostendorf, M
Fast Search Algorithms for Connected Phone Recognition Using the Stochastic Segment Model – 235

Ottaduy, P. J.
Real Time Flux Control in PM Motors – 84

Ou, Shichao
A Framework for Learning Declarative Structure – 239

Oudot, B. J. P.
Isothermal (Delta)/(Alpha-Prime) Transformation and TTT Diagram in a Plutonium Gallium Alloy – 38

Ozbek, Ali
Simultaneous Inversion of Velocity and Density Profiles – 236

Ozoroski, Thomas A.
High Altitude Long Endurance Air Vehicle Analysis of Alternatives and Technology Requirements Development – 14

Ozveren, Cuneyt M
Observability of Discrete Event Dynamic Systems. Revision – 183

Pacheco, P
Measured Effects of a Narrowband Interference Suppressor on GPS Receivers – 99

Pair, Jarrell
A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Human Emotional State and its Relevance for Military VR Training – 202

Paley, Suzanne M
A Storage System for Scalable Knowledge Representation – 309

Palmer, J. A.
Investigation of Temporal Contrast Effects in Femtosecond Pulse Laser Micromachining of Metals – 291

Palmer, T.
In-Situ Observation of Phase Transformations During Welding of 1045 Steel Using Spatially Resolved and Time Resolved X-Ray Diffraction – 56

Palo, Scott E
Issues and Implications of the Thermal Control System on Responsive Space Missions – 29

Pan, Dongfeng
Nuclear Imaging for Assessment of Prostate Cancer Gene Therapy – 158

Panchenko, Dmitry
Risk Bounds for Mixture Density Estimation – 246

Pang, Li-ping
Development of Controlled Ecological Life-support System in Russia – 176

Papadimitriou, Spiros
Fully Automatic Cross-Associations – 302

Tri-Plots: Scalable Tools for Multidimensional Data Mining – 308

Papavasiliou, A.
MEMS Actuated Deformable Mirror – 259

Papic, Igor
Analysis of Flicker Levels in the Slovenian Transmission Network – 81

Parazzoli, C. G.
Metamaterial Scanning Lens Antenna Systems and Methods – 70

Paris, K. N.
Layered Sediments, Rampart Craters, and Potential Fluvio-Lacustrine Activity in S.W. Arabia Terra, Mars: Support for a History of Aqueous Conditions – 332

Park, D. S.
Gallium Nitride Crystals and Wafers and Method of Making – 264

Park, Jisun
Ar-39-Ar-40 Ages of Two Nakhlites, MIL03346 and Y000593: A Detailed Analysis – 327

Parker, J.
Directed Energy System for Defeat of Improvised Explosive Devices and Landmines – 288

Parks, Jack G
Survivability: A Markov Process – 247

Parrish, Clyde F.
Concentration of Hydrogen Peroxide – 47

Parthasarathy, Triplicane A
Computational Design of UHTC Materials for Hypersonic Applications (Preprint) – 61

Patel, K.
Polymerization Welding and Application to Microfluidics – 60

Patel, Parimal
The Effect of Hot Isostatic Pressing on the Optical Properties Of Spinel – 62

Patel, Ronakkumar
Dealing with Out of Domain Questions in Virtual Characters – 219

Patterson, Philip
The Effect of Hot Isostatic Pressing on the Optical Properties Of Spinel – 62

Paul, Heather
Digital Learning Network Education Events of NASA's Extreme Environments Mission Operations – 331

Paul, Victor J
A Ground Vehicle Simulation Design to Study Driver Display Concepts – 64

Pavlik, David E
The Development of a Logistical Body of Knowledge for the Department of Defense – 313

Paxton, B.
Characterization of Materials with Optically Shaped Acoustic Waveforms – 272

Paxton, William H
Experiments in Speech Understanding System Control – 67

Payne, Frank
Progress in Flaps Down Flight Reynolds Number Testing Techniques at the NTF – 12

Payton, R. M.
Natural Fiber Spin Reflectometer Providing a Virtual Differential Signal Sensing Array Capability – 289

Peacock, R. D.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Post-Construction Fires Prior to September 11, 2001. NIST NCSTAR 1-4A – 119

Pellmar, T C
Toxicological Evaluation of Depleted Uranium in Rats: Six-Month Evaluation Point – 168

Pena, Joaquin
A Model-Driven Architecture Approach for Modeling, Specifying and Deploying Policies in Autonomous and Autonomic Systems – 224

Pentland, Alex P
Learning and Recognition in Natural Environments – 227

Pentland, Alex
Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative – 311

Pepper, S. V.
Characterization of Lubricants on Ball Bearings by FT-IR Using an Integrating Sphere – 52

Perronnet, M.
A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 328

Persinger, Justin A.
Post Irradiation Evaluation of Thermal Control Coatings and Solid Lubricants to Support Fission Surface Power Systems – 114

Peskin, Barbara
Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

Rapid Match Training for Large Vocabularies – 313

Petajan, Eric
Creating Interactive Virtual Humans: Some Assembly Required – 205

Peters, B. T.
A Hypothetical Perspective on the Relative Contributions of Strategic and Adaptive Control Mechanisms in Plastic Recalibration of Locomotor Heading Direction – 155

Development of Training Programs to Optimize Planetary Ambulation – 179

Locomotor Dysfunction after Spaceflight: Characterization and Countermeasure Development – 151

Peters-Lidard, Christa D.
An Integrated High Resolution Hydrometeorological Modeling Testbed using LIS and WRF – 144

Petrov, I.
Tem Mems Device Holder and Method of Fabrication – 93

Pettersson, Filippa
Nuclear Receptor Interactions in Breast Cancer: The Role of Kinase Signaling Pathways – 172

Pfajfar, Tomaz
Analysis of Flicker Levels in the Slovenian Transmission Network – 81

Philip, J.
Average Volume of a Random Tetrahedron in a Tetrahedron – 192

Phillips, R
Virtual Design and Testing of Materials: A Multiscale Approach – 40

Phillips, S.
Trough Receiver Heat Loss Testing – 129

Phillips, T.
High Energy X-Ray Imager for Inertial Confinment Fusion at the National Ignition Facility – 272

Pickett, R. M.
Motion-Based Visualization, Part One – 197

Motion-Based Visualization, Part Two – 196

Pieklik, Suzanne
Implementation of the Asthma Practice Guideline in the Army Medical Department: Evaluation of Process and Effects – 161

Pierce, R. Bradley
Comparison of Satellite Observations of Nitrogen Dioxide to Surface Monitor Nitrogen Dioxide Concentration – 135

Pietilainen, Jorma
Session 7: Energy Saving Performance Contracts: Forms and Financing Options. Overview of Activities Related to Energy Efficiency Improvement in Finland – 133

Pikuta, Elena V.
Trichococcus Patagoniensis sp. nov., a Facultative Anaerobe that grows at -5 C, Isolated from Penguin Guano in Chilean Patagonia – 155

Pilli, A.
CETIS: Complex Effluents Toxicity Information System. CETIS Retrieval System User's Manual – 306

Pincoske, Jeremy
Phase I Cultural Resources Survey and Archeological Inventory of a Proposed 1.12 ha (2.87 ac) Borrow Pit and an Associated Access Road, Ascension Parish, Louisiana – 126

Pinge, Rachael L
Characteristic Shape Sequences for Measures on Images – 252

Pinkus, Alan R
A Unified Taxonomic Approach to the Laboratory Assessment of Visionic Devices – 184

Pippin, Margaret R.
Comparison of Satellite Observations of Nitrogen Dioxide to Surface Monitor Nitrogen Dioxide Concentration – 135

Pitman, J.
Titan Orbiter with Aerorover Mission (TOAM) – 319

Pivi, M.
Perfect Electrode to Suppress Secondary Electrons Inside the Magnets – 278

Placeway, P
Byblos Speech Recognition Benchmark Results – 226

Plaia, Jim
Laser Shearography Inspection of TPS (Thermal Protection System) Cork on RSRM (Reusable Solid Rocket Motors) – 115

Platnick, Steven
Model Calculations of Solar Spectral Irradiance in the 3.7 Micron Band for Earth Remote Sensing Applications – 141

Plawski, T.
Commissioning of the Digital LLRF for CEBAF Injector/Separator – 269

Pochan, D. J.
Novel Hydrogels and Uses Thereof – 43

Poggio, Tomaso
Bagging Regularizes – 246
Biologically Plausible Neural Model for the Recognition of Biological Motion and Actions – 225
Direction Estimation of Pedestrian from Images – 291
Perceptual Evaluation of Video-Realistic Speech – 71
Selectivity of Local Field Potentials in Macaque Inferior Temporal Cortex – 226
Statistical Learning: Stability is Sufficient for Generalization and Necessary and Sufficient for Consistency of Empirical Risk Minimization – 256

Pokrant, Marie
Phase I Cultural Resources Survey and Archeological Inventory of a Proposed 1.12 ha (2.87 ac) Borrow Pit and an Associated Access Road, Ascension Parish, Louisiana – 126

Polakowski, Michael
Using Bayesian Model Averaging to Calibrate Forecast Ensembles – 146

Polifroni, Joseph
Experiments in Evaluating Interactive Spoken Language Systems – 315

Pollock, B. B.
High Magnetic Field Generation for Laser-Plasma Experiments – 270

Polman, Albert
E-MRS Spring Meeting - Nanophotonic Materials Session – 97

Polsky, Susan
Arcjet Semi-Elliptic Nozzle Simulations and Validation in Support of TPS Testing – 101

Ponte, Jay
MiTAP for Bio-Security: A Case Study – 311
MiTPA for Real Users, Real Data, Real Problems – 307

Poovendran, Radha
A Comparison of Power-Efficient Broadcast Routing Algorithms – 132
A Novel Power-Efficient Broadcast Routing Algorithm Exploiting Broadcast Efficiency – 132
A Set-Covering Approach for Modeling Attacks on Key Predistribution in Wireless Sensor Networks – 214
CARAVAN: Providing Location Privacy for VANET – 68
Cross-Layer Design for Energy-Efficient Secure Multicast Communications in Ad Hoc Networks – 132
Design Issues on Broadcast Routing Algorithms using Realistic Cost-Effective Smart Antenna Models – 237
Maximizing Static Network Lifetime of Wireless Broadcast Adhoc Networks – 131
Secure Broadcast in Energy-Aware Wireless Sensor Networks – 131
VP3: Using Vertex Path and Power Proximity for Energy Efficient Key Distribution – 131

Pope, Marie
Intelligent Agents for Computer-Generated Forces – 9

Porter, Kevin R
Enhancing the Immunogenicity of a Dengue-2 DNA Vaccine with Adjuvants and Anti-Fc(gamma)RI Antibodies – 163

Porter, T. A.
Inverse Compton Emission from Galactic Supernova Remnants: Effect of the Interstellar Radiation Field – 322
Inverse Compton Scattering on Solar Photons, Heliospheric Modulation, and Neutrino Astrophysics – 322

Potter, C. S.
Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 125

Povh, Dusan
Possibilities and Limitations of Electric Power Transmission Over Long Distances Part 2 - Long distance AC transmission – 78
Possibilities and Limitations of Electric Power Transmission Over Long Distances – 80

Powers, T.
Jefferson Lab's Distributed Data Acquisition – 296

Praissman, J.
High-Throughput Methods for Determining Electron Density Distributions and Structures of Crystals – 42

Prasad, K.
Fire Dynamics Simulator (Version 3) User's Guide – 103

Presser, C.
Benchmark Experimental Database for Multiphase Combustion Model Input and Validation: A Users Follow-Up – 103

Price, D.
Solid-Density Plasma Characterization with X-Ray Scattering on the 200-J Janus Laser – 271

Price, L.
Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions – 143

Prince, Jill L.
Autonomous Aerobraking Using Thermal Response Surface Analysis – 34

Pritychenko, B.
Nuclear Reaction and Structure Databases of the National Nuclear Data Center – 323

Privitzer, Eberhardt
Effects of Head Mounted Devices on Head-Neck Dynamic Response to +GZ Accelerations – 180
Mass Properties and Inertial Loading Effects of Head Encumbering Devices – 181

Prok, Y.
Local Duality in Spin Structure Functions g1(p) and g1(d) – 278

Proulx, G.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Analysis of Published Accounts of the World Trade Center Evacuation. NIST NCSTAR 1-7A – 120

Prozzi, J.
Performance Comparison of Hot Rubber Crack Sealants to Emulsified Asphalt Crack Sealants – 42

Pruess, K.
Leakage from Geologic Storage Reservoirs of CO2 – 137

Przekwas, Andrzej J
Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics – 161

Purtell, T. J.
Architecture for Rendering Graphics on Output Devices Over Diverse Connections – 305

Pusnik, Igor
Development of the System for Determination of the Size-of-Source Effect – 75
Uncertainty of the Characteristic of the Size-of-Source Effect in Radiation Thermometers – 82

Puzas, J. Edward
Natural Calcium Isotopic Composition of Urine as a Marker of Bone Mineral Balance – 155

Qiu, Shu-dong
Protective Effects of Vitamin E on Injury to Male Reproductive Function in Tail-suspended Rats – 179

Qu, Zhan-sheng
Simulation Study on Performance of Control by Man and Machine in the Stage of Final Approaching for Rendezvous and Docking – 175

Quiter, Elaine
Implementation of the Asthma Practice Guideline in the Army Medical Department: Evaluation of Process and Effects – 161

Radcliffe, Joshua
Radiation and Scattering Compact Antenna Laboratory – 97

Raddin, James H
Minimizing the Sequenced Delay Time for Escape From High-Speed Low-Level Flight Profiles – 9

Radeka, V.
CCD and PIN-CMOS Developments for Large Optical Telescope – 332

Radousky, H. B.
Different Precursor Populations Revealed by Microsciouc Studies of Bulk Damage in KDP and DKDP Crystals – 43
Multi Dimensional Investigation of Laser Conditioning in KDP and DKDP Crystals – 290

Raftery, Adrian E
Calibrated Probabilistic Mesoscale Weather Field Forecasting: The Geostatistical Output Perturbation (GOP) Method – 146
Determining the Number of Colors or Gray Levels in an Image Using Approximate Bayes Factors: The Pseudolikelihood Information Criterion (PLIC) – 245
Easy Computation of Bayes Factors and Normalizing Constants for Mixture Models via Mixture Importance Sampling – 245
Easy Estimation of Normalizing Constants and Bayes Factors from Posterior Simulation: Stabilizing the Harmonic Mean Estimator – 246
Model Validation and Spatial Interpolation by Combining Observations with Outputs from Numerical Models via Bayesian Melding – 244
Robust Estimation of cDNA Microarray Intensities with Replicates – 245
Strictly Proper Scoring Rules, Prediction and Estimation – 255
Using Bayesian Model Averaging to Calibrate Forecast Ensembles – 146

Raftery, Adrian
Incremental Model-Based Clustering for Large Datasets With Small Clusters – 254

Rakhlin, Alexander
Risk Bounds for Mixture Density Estimation – 246

Rakhlin, Alex
Bagging Regularizes – 246

Ramachandran, Sowmya
Using Computer Games to Train Information Warfare Teams – 208

Ramanujam, Nimmi
Miniature and Molecularly Specific Optical Screening Technologies for Breast Cancer – 161

Ramsey, J. L.
Biological Restoration of Major Transportation Facilities Domestic Demonstration and Application Project (DDAP): Technology Develop(ment aat Sandia National Laboratories – 60

Ramsey, J. M.
Devices with Small-Scale Channels and the Fabrication Thereof by Etching – 89
Methods for Forming Small-Volume Electrical Contacts and Material Manipulations with Fluidic Microchannels – 104

Randrup, J.
Baryon-Strangness Correlations: A Diagnostic of Strongly Interacting Matter – 273

Ranka, J. K.
Large Mode-Area Microstructure Optical Fiber – 90

Rantanen, E. M.
Development of Air Traffic Control Measurement Database – 7

Rao, C.
Advanced Quality Systems: Guidelines for Establishing and Maintaining Construction Quality Databases – 303

Rao, L.
Thermodynamics of Neptunium(V) Fluoride and Sulfate at Elevated Temperatures – 51

Rapchum, Dave
MEMS Microshutter for James Webb Space Telescope – 318

Rash, Clarence E
A Unified Taxonomic Approach to the Laboratory Assessment of Visionic Devices – 184

Rasmussen, P.
Positionering av Radiosaendare i Svar Radionmiljoe (Radio DF in Difficult Environment) – 68

Rathi, Runu
Iterative Structure Discovery in Graph-Based Data – 249

Raubenheimer, T.
Ion Effects in the Electron Damping Ring of the International Linear Collider – 295

Ravasio, A.
Solid-Density Plasma Characterization with X-Ray Scattering on the 200-J Janus Laser – 271

Raviprakash, Kanakatte
Enhancing the Immunogenicity of a Dengue-2 DNA Vaccine with Adjuvants and Anti-Fc(gamma)RI Antibodies – 163

Rawlins, James W
Coatings and Biodegradable and Bioabsorbable Films – 169

Ray, Chris
MEMS Microshutter for James Webb Space Telescope – 318

Razza, J. C.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Amendments to the Fire Protection and Life Safety Provisions of the New York City Building Code by Local Laws Adopted While World Trade Center 1, 2, and 7 Were in Use. NIST NCSTAR 1-1G – 121
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of Codes, Standards, and Practices in Use at the Time of the Design and Construction of World Trade Center 1, 2, and 7. NIST NCSTAR 1-1E – 118
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Comparison of the 1968 and Current (2003) New York City Building Code Provisions. NIST NCSTAR 1-1F – 118

Rea, Jeremy
Numerical Skip-Entry Guidance – 32

Rebak, R. B.
Comparative Corrosion Behavior of Two Palladium-Containing Titanium Alloys – 50
Methods to Calculate Corrosion Rates for Alloy 22 from Polarization Resistance Experiments – 49

Reed, A. W.
Energy Sustainability – 262

Reed, Jack
A Support Vector Machine Application on Vehicles – 107

Reeder, Florence
MiTAP for Bio-Security: A Case Study – 311

Reese, Y. D.
Sm-Nd and Rb-Sr Ages for MIL 05035: Implications for Surface and Mantle Sources – 331

Reese, Y.
Rb-Sr and Sm-Nd Isotopic Studies of Martian Depleted Shergottes SaU 094/005 – 327

Reger, Greg
A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Regli, William C
Hierarchical Role-based Viewing for Multi-level Information Security in Collaborative CAD – 307

Rehm, J. E.
Mobile Monolithic Polymer Elements for Flow Control in Microfluidic Devices – 102

Rehm, R. G.
Fire Dynamics Simulation (Version 2): Technical Reference Guide – 103

Reid, Alexander
A Ground Vehicle Simulation Design to Study Driver Display Concepts – 64

Reifman, Jaques
Software Tool for Analysis of Variance of DNA Microarray Data – 163

Reising, John M
Flight Display Integration – 26

Reising, John
Two Chapters of Technical Report: Unmanned Military Vehicles - Human Factors of Augmenting the Force Chapter 1: Introduction Chapter 8: Summary: Issues and Conclusions – 185

Reminga, Jeff
ORA: Organization Risk Analyzer – 210

Response Surface Methodology – 232

Ren, Hsuan
New Hyperspectral Discrimination Measure for Spectral Characterization – 228

Ren, Lei
Evaluating Shielding Effectiveness for Reducing Space Radiation Cancer Risks – 334

Repperger, Daniel W
Enhancement of Stochastic Resonance Using Optimization Theory – 249

Repperger, Daniel
Enhancement of Stochastic Resonance by Tuning System Parameters and Adding Noise Simultaneously – 248

Resinas, Manuel
A Model-Driven Architecture Approach for Modeling, Specifying and Deploying Policies in Autonomous and Autonomic Systems – 224

Restaino, Sergio
Design Considerations for the Second-Generation NPOI Fringe Tracker and Science Beam Combiner – 292

Reuter, Lisa J
The Development of a Business Case Analysis for the Acquisition of the Agile Rapid Global Combat Support System Used for the USA Marine Corps' Ground Equipment – 66

Reynolds, Anthony
Crack Growth and Stress Intensity Prediction Techniques. Delivery Order 0027-1: Mixed Mode Failure Criteria – 281

Rhee, In-Sik
Biodegradability of JP-8 Fuel in the Aquatic Environment – 63

Rhodes, R B
Intensity Analysis of Recurrence Plots for the Detection of Deterministic Signals in Noise – 246

Ricco, Antonia
Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics – 161

Richards, J. T.
A Hypothetical Perspective on the Relative Contributions of Strategic and Adaptive Control Mechanisms in Plastic Recalibration of Locomotor Heading Direction – 155

Richardson, J. G.
Structures Including Network and Topology for Identifying, Locating and Quantifying Physical Phenomena – 39

Rickel, J
Simulation Meets Hollywood: Integrating Graphics, Sound, Story and Character for Immersive Simulation – 200

Rickel, Jeff
Creating Interactive Virtual Humans: Some Assembly Required – 205

Toward a New Generation of Virtual Humans for Interactive Experiences – 205

Ricks, A.
Validation Experiments to Determine Radiation Partitioning of Heat Flux to an Object in a Fully Turbulent Fire – 104

Riedl, Mark O
Mixing Story and Simulation in Interactive Narrative – 203

Towards Integrating AI Story Controllers and Game Engines: Reconciling World State Representations – 201

Riezler, Stefan
Speed and Accuracy in Shallow and Deep Stochastic Parsing – 241

Rifkin, R
Measured Effects of a Narrowband Interference Suppressor on GPS Receivers – 99

Rifkin, Ryan
Bagging Regularizes – 246

Statistical Learning: Stability is Sufficient for Generalization and Necessary and Sufficient for Consistency of Empirical Risk Minimization – 256

Righter, Kevin
Not So Rare Earth? New Developments in Understanding the Origin of the Earth and Moon – 124

Riley, B. J.
FY 2005 Miniature Spherical Retroreflectors Final Report – 258

Riley, J. T.
Investigations of Performance of Pneumatic Deicing Boots, Surface Ice Detectors, and Scaling of Intercycle Ice – 2

Riley, M. A.
Reactive Materials and Thermal Spray Methods of Making Same – 56

Rimmber, R. A.
JLAB Ampere-Clast Cryomodule Conceptual Design – 260

Rios, M.
Investigations of Performance of Pneumatic Deicing Boots, Surface Ice Detectors, and Scaling of Intercycle Ice – 2

Rippel, W. E.
Lamination Cooling System Formation Methods – 90

Ritzert, Frank J.
High Temperature Stability of Dissimilar Metal Joints in Fission Surface Power Systems – 57

Rivetta, C.
Design and Testing of Gproto bunch-by-bunch Signal Processor – 294

Rizzo, Albert
A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Development of a Data Management Tool for Investigating Multivariate Space and Free Will Experiences in Virtual Reality – 201

Human Emotional State and its Relevance for Military VR Training – 202

Roberts, R. B.
Motion-Based Visualization, Part One – 197

Motion-Based Visualization, Part Two – 196

Robic, Borut
Mesh Partitioning with Ant Colonies – 76

Robinett, R. D.
Energy Sustainability – 262

Robinette, Kathleen M
Principles of Fit to Optimize Helmet Sizing – 185

Roble, Raymond G.
Mesospheric Dynamical Changes Induced by the Solar Proton Events in October-November 2003 – 145

Rock, Paul B
Validation of a Shortened Electronic Version of the Environmental Symptoms Questionnaire – 160

Rodriquez, M. C.
Decontamination of Genesis Array Materials by UV Ozone Cleaning – 329

Genesis Silicon Carbide Concentrator Target 60003 Preliminary Ellipsometry Mapping Results – 329

Roeske, F.
Method of Defining Features on Materials with a Femtosecond Laser – 288

Rogovin, D. N.
Method and System for Determining the Position of a Short Circuit in a Branched Wiring System – 91

Method and System for Identifying Damage to a Wire – 92

Methods and Systems for Detecting and Locating Damage in a Wire – 92

Methods and Systems for Testing Wire Insulation – 92

Rohde, G K
Intensity Analysis of Recurrence Plots for the Detection of Deterministic Signals in Noise – 246

Rohlicek, J R
Fast Search Algorithms for Connected Phone Recognition Using the Stochastic Segment Model – 235

Rokhlin, Vladimir
On Interpolation and Integration in Finite-Dimensional Spaces of Bounded Functions – 233

Roos, E. V.
Method of Defining Features on Materials with a Femtosecond Laser – 288

Rosario, Eddie N
Multipath Mitigation Performance of Planar GPS Adaptive Antenna Arrays for Precision Landing Ground Stations – 95

Rose, F. G.
Global, Multi-Year Analysis of Clouds and Earth's Radiant Energy System Terra Observations and Radiative Transfer Calculations – 142

Rose, Fred G.
Validation of the Archived CERES Surface and Atmosphere Radiation Budget (SARB) at SGP – 142

Rose, J. P.
High-Throughput Methods for Determining Electron Density Distributions and Structures of Crystals – 42

Rosenberg, Milton
Building Explainable Artificial Intelligence Systems – 223

Reflective Tutoring for Immersive Simulation – 220

Rosenberg, T
Project Clinker, Hydraulic Carriage for Airship Installation of Optical Equipment – 16

Rosenquist, G.
Tariff Analysis Project: A Database and Analysis Platform for Electrictiy Tariffs – 306

Rose-Pehrsson, Susan L
Passive Badge Assessment for Long-Term, Low-Level Air Monitoring on Submarines: VOC Badge Validation – 44

Ross, J. S.
High Magnetic Field Generation for Laser-Plasma Experiments – 270

Rossman, Jeremy S
Spatial-Temporal Mapping of the T Cell Receptor NF-kappaB Signaling Pathway – 152

Roth, Robert
Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

Rapid Match Training for Large Vocabularies – 313

Rotter, M.
Directed Energy System for Defeat of Improvised Explosive Devices and Landmines – 288

Rowe, Steve
Improving Human Interfaces in Military Simulation Applications – 210

Roy, A
Computational Design of UHTC Materials for Hypersonic Applications (Preprint) – 61

Ruben, Harvey
Modeling, Analysis, Simulation, and Synthesis of Biomolecular Networks – 162

Rubenchik, A. M.
Size Selection Initiation Model Extended to Include Shape and Random Factors – 197

Summary of Recent Damage-Initiation Experiments on KDP Crystals – 291

Rubenchik, A.
Directed Energy System for Defeat of Improvised Explosive Devices and Landmines – 288

Ruf, Joseph H.
NASA/MSFC's Calculation for Test Case 1a of ATAC-FSDC Workshop on Afterbody and Nozzle Flows – 101

Ruiz-Cortes, Antonio
A Model-Driven Architecture Approach for Modeling, Specifying and Deploying Policies in Autonomous and Autonomic Systems – 224

Rulis, Susan
Exploration Life Support Technology Development Challenges – 327

Rupen, M.
GRO J1655-40: Early Stages of the 2005 Outburst – 320

Rush, Kristopher
Defense in Depth: Foundation for Secure and Resilient IT Enterprises – 218

Russell, A. M.
Ultra-Hard Low Friction Coating Based on ALMGB14 for Reduced Wear on MEMS and Other Tribiological Components and System – 59

Rustenburg, J. W.
Statistical Loads Data for the Boeing 777-200ER Aircraft in Commercial Operations – 15

Rutan, D. A.
Global, Multi-Year Analysis of Clouds and Earth's Radiant Energy System Terra Observations and Radiative Transfer Calculations – 142

Rutan, David A.
Validation of the Archived CERES Surface and Atmosphere Radiation Budget (SARB) at SGP – 142

Rutley, T. M.
Development of Training Programs to Optimize Planetary Ambulation – 179

Ruttley, T.
A Hypothetical Perspective on the Relative Contributions of Strategic and Adaptive Control Mechanisms in Plastic Recalibration of Locomotor Heading Direction – 155

Ryan, Donna H
Weight Measurements and Standards for Soldiers – 165

Ryan, Harry M.
Runtime and Pressurization Analyses of Propellant Tanks – 36

Ryan, Harry
Overview of Engineering Design and Analysis at the NASA John C. Stennis Space Center – 22

Rzhetsky, Andrey
Geneways for Biocomputing – 309

Sadek, R
Emotionally Evocative Environments for Training – 212

Safe, Stephen
Inhibitory Ah Receptor-Androgen Receptor Crosstalk in Prostate Cancer – 170

Sagalowicz, Daniel
A Team User's Guide – 314

Sahimi, M.
Novel Anionic Clay Adsorbents for Boiler-Blow Down Waters Reclaim and Reuse. (Final Report, September 1, 2004-August 31, 2005) – 49

Sahota, J.
Polymeric Bioresorbable Composites Containing an Amorphous Calcium Phosphate Polymer Ceramic for Bone Repair and Replacement – 45

Sain, W. D.
Analysis Procedures for Double-Shell Target Concentricity and Wall Thickness – 271

SaintCyr, William
Fiber Optic Raman Sensor to Monitor Concentration Ratio of Nitrogen and Oxygen in a Cryogenic Mixture – 286

Sako, M.
X-Ray Spectral Study of the Photoionized Stellar Wind in Vela X-1 – 324

Saley, Dave
NASA CEV Reference GN&C Architecture – 21

Salido, Javier
VP3: Using Vertex Path and Power Proximity for Energy Efficient Key Distribution – 131

Sallaberry, C. J.
Survey of Sampling-Based Methods for Uncertainty and Sensitivity Analysis – 242

Salvatore, Randal A
Direct Measurement of Population-Induced Broadening of Quantum Well Intersubband Transitions – 284

Sampigethaya, Krishna
CARAVAN: Providing Location Privacy for VANET – 68

Sanjurjo, A.
Methods and Apparatuses for Producing Metallic Compositions via Reduction of Metal Halides – 55

Sant, P. A.
Electronic Device and Process for Forming Same – 90

Santiago, Juan G
Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics – 161

Sappington, Carol
MEMS Microshutter for James Webb Space Telescope – 318

Sarapu, Leslie
Defense Infrastructure: Continuing Challenges in Managing DOD Lodging Programs as Army Moves to Privatize Its Program – 122

Sargsyan, A. E.
Organization, Management and Function of International Space Station (ISS) Multilateral Medical Operations – 180

Saringe, R. P.
Nanotube Composites and Methods for Producing – 46

Sarrazin, Philippe C.
Powder Handling Device for Analytical Instruments – 112

Satagopan, Jaya M
Easy Estimation of Normalizing Constants and Bayes Factors from Posterior Simulation: Stabilizing the Harmonic Mean Estimator – 246

Sawka, M N
Heat Related Illnesses – 179

Saylor, Daniel A
Dynamic IR Scene Projector Based Upon the Digital Micromirror Device – 74

Scarvie, T.
Particle Tracking and Simulation on the .NET Framework – 272

Scattone, Francesco
Large Vocabulary Recognition of Wall Street Journal Sentences at Dragon Systems – 313

Schaeffler, Norman W.
High-Lift System for a Supercritical Airfoil: Simplified by Active Flow Control – 14

Schartz, A. J.
Isothermal (Delta)/(Alpha-Prime) Transformation and TTT Diagram in a Plutonium Gallium Alloy – 38

Schauer, Frederick R
Pulse Detonation Physiochemical and Exhaust Relaxation Processes – 24

Scheffey, Joseph
User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 208

Schiavone, Leonard J
Global Grid Architecture Concept – 303

Schilling, O.
– 257

Schlecht, Robin
Parametric Evaluation of Thin, Transonic Circulation-Control Airfoils – 3

Schloegel, J. J.
Ecology, Environmental Research at Argonne National Laboratory, 1955-1985 – 303

Schmerge, J. F.
Comparison Between H-Ion and Heat Cleaning of CU-Metal Cathodes – 269

Schmidt, H
Solid-State and Vacuum Thermionic Energy Conversion – 134

Schmidt, Vincent A
Specification for Visual Requirements of Work-Centered Software Systems – 211

Schneberk, D. J.
Analysis Procedures for Double-Shell Target Concentricity and Wall Thickness – 271

Schneider, J. P.
Novel Hydrogels and Uses Thereof – 43

Schneider, M. B.
Time-Resolved Soft X-Ray Imaging (SXRI) Diagnostic for Use at the NIF and OMEGA Lasers – 270

Schniter, P.
EM Threat Analysis for Wireless Systems – 71

Hardware-in-the-Loop Testing of Wireless Systems in Realistic Environments – 70

Schoenbach, K. H.
Method and Device for Creating a Micro Plasma Jet – 23

Schrijver, Carolus
Direct Imaging of Stellar Surfaces: Results from the Stellar Imager (SI) Vision Mission Study – 325

Schuler, Peter S.
Electrodynamic Tether – 32

Schwandt, C. S.
A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 328

Schwartz, R J.
Fluorescence Visualization of Hypersonic Flow over Rapid Prototype Wind-Tunnel Models – 4

Schwartz, R
Byblos Speech Recognition Benchmark Results – 226

Continuous Speech Recognition Using Segmental Neural Nets – 74

Improving State-of-the-Art Continuous Speech Recognition System Using the N-Best Paradigm with Neural Networks – 74

Schwartz, Richard
Adaptation to New Microphones Using Tied-Mixture Normalization – 71

Is N-Best Dead? – 241

Schwing, A. M.
Assessment of Turbulent Shock-Boundary Layer Interaction Computations Using the OVERFLOW Code – 101

Scofield, Thomas C
Epidemic Outbreak Surveillance (EOS) – 168

Scorpio, Angelo
Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 164

Seebauer, E. G.
Methods for Controlling Dopant Concentration and Activation in Semiconductor Structers – 93

Segalman, D. J.
Model Reduction of Systems with Localized Nonlinearities – 198

Seidl, P. A.
New Simulation Capabilities of Electron Clouds in Ion Beams with Large Tune Depression – 279

Sejnowski, Terrence J
Analysis of fMRI Data by Blind Separation into Independent Spatial Components – 169

Seneff, Stephanie
Experiments in Evaluating Interactive Spoken Language Systems – 315

Sephton, Mark A.
The Origin of Dark Inclusions in Allende: New Evidence from Lithium Isotopes – 330

Seryi, A.
Comparison of 2 mrad and 14/20 mrad Crossing Angle Extraction Lines – 296

Seshia, Sanjit A
A Boolean Approach to Unbounded, Fully Symbolic Model Checking of Timed Automata – 257

Sessler, A. M.
Ion Motion in the Adiabatic Focuser – 296

Sestak, S.
Decontamination of Genesis Array Materials by UV Ozone Cleaning – 329

Setina, J.
New High Capacity Getter for Vacuum Insulated Mobile Liquid Hydrogen Storage Systems – 105

Settecerri, Jeffrey J
Mass Properties and Inertial Loading Effects of Head Encumbering Devices – 181

Sezaki, Kaoru
CARAVAN: Providing Location Privacy for VANET – 68

Shackelfod, Linda
Natural Calcium Isotopic Composition of Urine as a Marker of Bone Mineral Balance – 155

Shafer, S. F.
Mixed Mode Fuel Injector and Injection System – 114

Shah, Arpan P
Scalable Authorization in Role-Based Access Control Using Negative Permissions and Remote Authorization – 217

Shah, K. S.
Lu(sup 1)xI(sup 3):Ce(sup x): A Scintillator for Gamma Ray Spectroscopy and Time-Of Flight Pet – 266

Very Fast Doped LaBr(sup 3) Scintillators and Time-Of-Flight Pet – 266

Shakouri, A
Control of Electric Field Domain Formation in Multiquantum Well Structures – 281

Performance Improvement in Quantum Well Lasers by Optimizing Band Gap Offset at Quantum Well Heterojunctions – 111

Solid-State and Vacuum Thermionic Energy Conversion – 134

Sub-100 muA Current Operation of Strained InGaAs Quantum Well Lasers at Low TemperaturesL – 111

Voltage-Controlled Tunable GaAs/AlGaAs Multistack Quantum Well Infrared Detector – 108

Shakouri, Ali
Cooling Enhancement Using Inhomogeneous Thermoelectric Materials – 298

Direct Measurement of Population-Induced Broadening of Quantum Well Intersubband Transitions – 284

Material Optimization for Heterostructure Integrated Thermionic Coolers – 298

Nanoscale Devices for Solid State Refrigeration and Power Generation – 133

Quantum Interference Effect and Electric Field Domain Formation in Quantum Well Infrared Photodetectors – 109

Shalf, J.
HDF5-Fast Query: An API for Simplifying Access to Data Storage, Retrieval, Indexing and Querying – 302

High Performance Visualization using Query-Driven Visualization and Analytics – 188

Shaposhnikov, N.
GRO J1655-40: Early Stages of the 2005 Outburst – 320

Shappirio, M.
Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

Sharp, Marilyn A
Preliminary Derivation of Test Item Clusters for Predicting Injuries, Poor Physical Performance, and Overall Attrition in Basic Combat Training – 253

Shattopadhyay, S.
Performances of High Purity Niobium Cavities with Different Grain Sizes – 258

Shea, Dana A
The National Biodefense Analysis and Countermeasures Center: Issues for Congress – 152

Sheplak, Mark
MEMS Based Acoustic Array – 281

Shepodd, T. J.
Mobile Monolithic Polymer Elements for Flow Control in Microfluidic Devices – 102

Shih, C.-Y.
Rb-Sr and Sm-Nd Isotopic Studies of Martian Depleted Shergottes SaU 094/005 – 327

Shih, C-Y.
Sm-Nd and Rb-Sr Ages for MIL 05035: Implications for Surface and Mantle Sources – 331

Shimp, Samual P
A Comparison of the Navy and the Air Force Budgeting and Execution Process for Aviation Fuel (AVFUEL) – 64

Shmakova, M.
Lensing Signals in the Hubble Ultra-Deep Field Using All 2nd-Order Shape Deformations – 321

Short, W.
Evaluation of Utility System Impacts and Benefits of Optimally Dispatched Plug-In Hybrid Electric Vehicles – 82

Shoshani, A.
Scientific Data Management Center – 190

Shrader, C. R.
GRO J1655-40: Early Stages of the 2005 Outburst – 320

Shull, R D
Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint) – 61

Sibeck, D. G.
Alfven Waves in the Solar Wind, Magnetosheath, and Outer Magnetosphere – 333

Sidorin, A.
Cooling Force Measurement in CELSIUS – 274

Siebert, Mark
A Bearingless Switched-Reluctance Motor for High Specific Power Applications – 23

Siewert, T. A.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Contemporaneous Structural Steel Specifications. NIST NCSTAR 1-3A – 120

Sigal, Asher
Aerodynamic Analysis of Body-Strake Configurations – 4

Sigrist, Lori
Weight Measurements and Standards for Soldiers – 165

Silc, Jurij
Mesh Partitioning with Ant Colonies – 76

Silk, J.
Luminosity Function of Faint Globular Clusters in M87 – 324

Silverberg, Robert
MEMS Microshutter for James Webb Space Telescope – 318

Silverman, Denise R
Human Factors Evaluation of the Aerial Gunner Scanner Simulator – 8

Silvers, Julie
Defense Infrastructure: Continuing Challenges in Managing DOD Lodging Programs as Army Moves to Privatize Its Program – 122

Simizu, Hiroaki
Direction Estimation of Pedestrian from Images – 291

Simmons, B. A.
Polymerization Welding and Application to Microfluidics – 60

Simon, Horst D.
HARP: A Fast Spectral Partitioner – 230

Simon, Terrence W.
Heat Transfer and Fluid Dynamics Measurements in the Expansion Space of a Stirling Cycle Engine – 37

Simpson, Brian D
The Effect of Microphone Placement on Localization Accuracy with Electronic Pass-Through Earplugs – 284

Simpson, D. J.
Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

Sims, William Herbert, III
Radio-Frequency Driven Dielectric Heaters for Non-Nuclear Testing in Nuclear Core Development – 285

Singh, Jagdish P.
Fiber Optic Raman Sensor to Monitor Concentration Ratio of Nitrogen and Oxygen in a Cryogenic Mixture – 286

Singh, R
Solid-State and Vacuum Thermionic Energy Conversion – 134

Singh, Siddhartha
CORES - Complex Organizational Reasoning System – 216

Sinha, Pawan
Dissociated Dipoles: Image Representation via Non-local Comparisons – 255

Sinton, J.
Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions – 143

Sirisup, Sirod
Gappy Data: To Krig or Not To Krig – 242

Sisk, D. R.
PNNL OS3700 Tritium Monitoring System Software and Hardware Operations Manual Rev. 0 – 197

Sittler, Edward C.
Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

Titan Orbiter with Aerorover Mission (TOAM) – 319

Sivanandam, N.
Exact Attractive Non-BPS STU Black Holes – 326

Sivertson, D. J.
CETIS: Complex Effluents Toxicity Information System. CETIS Retrieval System User's Manual – 306

Skala, Melissa C
Optical Spectroscopy and Multiphoton Imaging for the Diagnosis and Characterization of Hyperplasias in the Mouse Mammary – 172

Skaritka, J. R.
Novel Chamber Design for an In-Vacuum Cryo-Cooled Mini-Gap Undulator – 274

Skinn, D. A.
Statistical Loads Data for the Boeing 777-200ER Aircraft in Commercial Operations – 15

Skinner, G. K.
The Swift/BAT Hard X-ray Survey – 321

Skok, Kostja
Analysis of Flicker Levels in the Slovenian Transmission Network – 81

Skulan, Joseph
Natural Calcium Isotopic Composition of Urine as a Marker of Bone Mineral Balance – 155

Slater, M.
Direct Measurement of Geometric and Resistive Wakefields in Tapered Collimators for the International Linear Collider – 267

Slepoy, A.
Quantum Gate Decomposition Algorithms – 268

Sliger, W. A.
FY 2005 Miniature Spherical Retroreflectors Final Report – 258

Smit, A. F.
Advanced Quality Systems: Guidelines for Establishing and Maintaining Construction Quality Databases – 303

Smith, D. A.
GRO J1655-40: Early Stages of the 2005 Outburst – 320

Smith, K. L.
Advanced Quality Systems: Guidelines for Establishing and Maintaining Construction Quality Databases – 303

Smith, Scott M.
Natural Calcium Isotopic Composition of Urine as a Marker of Bone Mineral Balance – 155

Smith, Timothy
Live Modeling of a Dyna Vision SPR-02 Sensor for Rangefinding Application – 110

Smith, Wayne
MEMS Microshutter for James Webb Space Telescope – 318

Smits, Jan M.
Carbon Nanotube Based Light Sensor – 78

Smucker, Mark D
UMass at TREC 2004: Novelty and HARD – 310

Smyth, Vito S
Foundations in the Law: Classic Cases in Medical Ethics – 159

Snodgrass, Steve
MEMS Microshutter for James Webb Space Telescope – 318

Snow, Michael P
Flight Display Integration – 26

Soderlind, P.
Relativistic Effects on the Equation of State of the Light Actinides – 279

Sohn, Andrew
HARP: A Fast Spectral Partitioner – 230

Sohn, Euijung
A Comparison of Mamdani and Sugeno Methods for Modeling Visual Perception Lab Data – 252

A Comparison of the Detection Rates for Infrared and Visual Imagery of a Person Holdina an RPG – 109

Sokolsky, Oleg
Modeling, Analysis, Simulation, and Synthesis of Biomolecular Networks – 162

Solomon, Steve
Building Explainable Artificial Intelligence Systems – 223

Explainable Artificial Intelligence for Training and Tutoring – 220

Reflective Tutoring for Immersive Simulation – 220

Sondheimer, Norman K
The Rate of Progress in Natural Language Processing – 316

Song, Jian
Effects of Microgravity on Human Spatial Orientation in Space Flight – 175

Song, Xin-ai
Prophylactic Effects of Choline Chloride on Muscle Atrophy in Tail-suspended Rats – 177

Sonna, Larry A
Software Tool for Analysis of Variance of DNA Microarray Data – 163

Soo Hoo, Kevin J
Information Warfare and International Law – 314

Sood, Ashwani
Prostate Derived Ets Factor, an Immunogenic Breast Cancer Antigen – 166

Soref, Richard A
Improved Temperature Characteristics in Quantum Dot Lasers with Indirect-Bandgap Barriers – 97

Soroush, M.
Exact Attractive Non-BPS STU Black Holes – 326

Spaeth, M. L.
Summary of Recent Damage-Initiation Experiments on KDP Crystals – 291

Spain, Jim C
Evolution of Catabolic Pathways for Synthetic Compounds Bacterial Pathways for Degradation of 2,4-dinitrotoluene and Nitrobenzene – 164

Spann, Cheronda V
A Critical Analysis of the Acquisition Review Journal: Are We in Step with the Field? – 314

Specker, Lawrence J
Minimizing the Sequenced Delay Time for Escape From High-Speed Low-Level Flight Profiles – 9

Spiker, Alan
Human Factors Evaluation of the Aerial Gunner Scanner Simulator – 8

Spinks, G.
Ionic Solvents Used in Ionic Polymer Transducers, Sensors and Actuators – 41

Spirkovska, Liljana
Intelligent Weather Agent – 112

Sporns, Olaf
Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative – 311

Srihari, Rohini
Information Extraction Supported Question Answering – 309

Srinivasan, G.
Magnetoelectric Multilayer Composites for Field Conversion – 91

Srinivasan, Hari
Solid Oxide Fuel Cell APU Feasibility Study for a Long Range Commercial Aircraft Using UTC ITAPS Approach – 22

Srivastava, A.
Carbon Nanotube Filter – 41

Srivastava, O. N.
Carbon Nanotube Filter – 41

Stach, E. A.
Tem Mems Device Holder and Method of Fabrication – 93

Stafforini, Diana M
Using Genetically Engineered Mice to Probe the Role of Bioactive Lipids in Prostate Carcinogenesis – 157

Stainer, M.
Electronic Device and Process for Forming Same – 90

Stanford, Derek C
Determining the Number of Colors or Gray Levels in an Image Using Approximate Bayes Factors: The Pseudolikelihood Information Criterion (PLIC) – 245

Stanford, Malcolm K.
Post Irradiation Evaluation of Thermal Control Coatings and Solid Lubricants to Support Fission Surface Power Systems – 114

Stansbery, E. K.
Decontamination of Genesis Array Materials by UV Ozone Cleaning – 329

Genesis Silicon Carbide Concentrator Target 60003 Preliminary Ellipsometry Mapping Results – 329

Steele, Russell J
Easy Computation of Bayes Factors and Normalizing Constants for Mixture Models via Mixture Importance Sampling – 245

Stefanik, Todd
Transparent Yttria for IR Windows and Domes - Past and Present – 292

Stein, Clifford
Parallel Algorithms for the Assignment and Minimum-Cost Flow Problems – 252

Steinetz, Bruce M.
Turbomachinery Clearance Control – 115

Steinkamp, M.
– 257

Steptoe-Jackson, Rosalind
MEMS Microshutter for James Webb Space Telescope – 318

Stern, Andrew
Mixing Story and Simulation in Interactive Narrative – 203

Sterritt, Roy
A Model-Driven Architecture Approach for Modeling, Specifying and Deploying Policies in Autonomous and Autonomic Systems – 224

Stewart, C. L.
Mixed Mode Fuel Injector and Injection System – 114

Stewart, T. L.
FY 2005 Quantum Cascade Laser Alignment System. Final Report – 289

Stewart, Tiffany
Weight Measurements and Standards for Soldiers – 165

Stockinger, K.
HDF5-Fast Query: An API for Simplifying Access to Data Storage, Retrieval, Indexing and Querying – 302

High Performance Visualization using Query-Driven Visualization and Analytics – 188

Stockman, Ida
Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative – 311

Stockton, M. C.
Direct Measurement of Geometric and Resistive Wakefields in Tapered Collimators for the International Linear Collider – 267

Stoltz, P. H.
New Simulation Capabilities of Electron Clouds in Ion Beams with Large Tune Depression – 279

Stone, E. C.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Stone, T. W.
Tunable Temporal Dispersion and Compensated Angular Dispersion in Optical Switching Systems – 88

Storlie, C. B.
Survey of Sampling-Based Methods for Uncertainty and Sensitivity Analysis – 242

Stowell, M. L.
Parallel Computer Implementation of Fast Low-Rank QR Approximation of the Biot-Savart Law – 188

Strahan, A.
NASA CEV Reference Entry GN&C System and Analysis – 21

Street, K. W.
Characterization of Lubricants on Ball Bearings by FT-IR Using an Integrating Sphere – 52

Street, Kenneth W., Jr.
Application of Carbon Based Nano-Materials to Aeronautics and Space Lubrication – 113

Strikman, M.
Transverse Imaging of the Proton in Exclusive Diffractive PP Scattering – 279

Strong, A. W.
Inverse Compton Emission from Galactic Supernova Remnants: Effect of the Interstellar Radiation Field – 322

Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Strzelecki, Joseph P
Loads Induced in the Lumbar Spine of Seated Restrained Humans by Sideward (+Gy) Impact – 181

Su, G. J.
Integrated Inverter for Driving Multiple Electric Machines – 89

Su, Hong yu
Space Medicine and Medical Engineering, Volume 19, No. 5 – 174

Subbotin, N.
Evaluation of a New Liquid Fire-Extinguishing Agent for Combustible Metal Fires – 42

Sulfredge, C. D.
Scaling of Thermal-Hydraulic Experiments for a Space Ranking Cycle and Selection of a Preconceptual Scaled Experiment Design – 285

Summers, L. J.
Gratings for High Energy Petawatt Lasers – 279

Sun, Gregory
Improved Temperature Characteristics in Quantum Dot Lasers with Indirect-Bandgap Barriers – 97

Sun, Xi-qing
Space Medicine and Medical Engineering, Volume 19, No. 5 – 174

Sundaram, Shankar
Quantitative Developments of Biomolecular Databases, Measurement Methodology, and Comprehensive Transport Models for Bioanalytical Microfluidics – 161

Sur, Mriganka
Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative – 311

Sura, Bhargavi
User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 208

Surber, Lewis
Optimal Control of Shock Wave Turbulent Boundary Layer Interactions Using Micro-Array Actuation – 2

Suslov, V. M.
Study of the (sub Lambda)(sup 7)He Hypernucleus in Formalism of the Faddeev Equations – 277

Sustaric, Ronald R.
Powered Descent Trajectory Guidance and Some Considerations for Human Lunar Landing – 331

Sutliff, Daniel L.
Rotating Rake Mode Measurements Over Passive Treatment in a Ducted Fan – 283

Sutton, Michael A
Crack Growth and Stress Intensity Prediction Techniques. Delivery Order 0027-1: Mixed Mode Failure Criteria – 281

Swank, J. H.
The ROSSI X-Ray Timing Explorer: Capabilities, Achievements and Aims – 325

Swank, Jean
GRO J1655-40: Early Stages of the 2005 Outburst – 320

Swanson, Reid
Automated Commonsense Reasoning About Human Memory – 219

Swartout, W
Simulation Meets Hollywood: Integrating Graphics, Sound, Story and Character for Immersive Simulation – 200

Swartout, William
Toward a New Generation of Virtual Humans for Interactive Experiences – 205

Sweeney, John
A Framework for Learning Declarative Structure – 239

Sweeney, Latanya
Preserving Privacy by De-identifying Facial Images – 73

Szego, K.
Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

Szoboszlay, Zoltan
Comanche Helmet-Mounted Display Symbology Simulation – 20

Szykman, James J.
Comparison of Satellite Observations of Nitrogen Dioxide to Surface Monitor Nitrogen Dioxide Concentration – 135

Tague, Patrick
A Set-Covering Approach for Modeling Attacks on Key Predistribution in Wireless Sensor Networks – 214

Talapatra, S.
Carbon Nanotube Filter – 41

Talapatra, Sukomal
Delta-Sigma UHF Digital Waveform Generator – 280

Tamblyn, Scott
NASA CEV Reference GN&C Architecture – 21

Taminger, Karen M. B.
Electron Beam Freeform Fabrication in the Space Environment – 319

Tandon, R.
Ultra High Temperature Ceramics for Hypersonic Vehicle Applications – 58

Tandy, Elizabeth M
17Beta-Estradiol Modulates the Response of Human Osteoblasts to Titanium Surface Roughness – 57

Tang, Jane
Trichococcus Patagoniensis sp. nov., a Facultative Anaerobe that grows at -5 C, Isolated from Penguin Guano in Chilean Patagonia – 155

Tang, Yong-kang
Development of a Complex Experimental System for Studies of Controlled Ecological Life Support Technique – 175

Tannenbaum, Allen
Geometric Variational Methods for Controlled Active Vision – 223

Tao, Wei-Kuo
An Integrated High Resolution Hydrometeorological Modeling Testbed using LIS and WRF – 144

Tassev, V L
Aluminum Nitride Substrate Growth by Halide Vapor Transport Epitaxy – 53

Tatem, Patricia A
User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 208

Taylor, Robert
Two Chapters of Technical Report: Unmanned Military Vehicles - Human Factors of Augmenting the Force Chapter 1: Introduction Chapter 8: Summary: Issues and Conclusions – 185

Tebbe, Jill M
Corrosion Preventing Characteristics of Military Hydraulic Fluids. Part 2 – 57

Tedder, Sarah
Development of Supersonic Combustion Experiments for CFD Modeling – 105

Teets, Edward H., Jr.
Turbulence and Mountain Wave Conditions Observed with an Airborne 2-Micron Lidar – 19

Tempel, W.
High-Throughput Methods for Determining Electron Density Distributions and Structures of Crystals – 42

Tenney, R R
Multiscale Representations of Markov Random Fields – 243

Tenney, Robert R
Multiscale Representations of Markov Random Fields – 247

Tepikian, S.
Experimental Studies of IBS in RHIC and Comparison with Theory – 262

Terrazas-Salinas, Imelda
Arcjet Semi-Elliptic Nozzle Simulations and Validation in Support of TPS Testing – 101

Teytelman, D.
Design and Testing of Gproto bunch-by-bunch Signal Processor – 294

Thakkar, Snehal
Exploiting Secondary Sources for Unsupervised Record Linkage – 307

Thames, Shelby F
Coatings and Biodegradable and Bioabsorbable Films – 169

Thayer Fabrega, F J
Protocol Independence through Disjoint Encryption – 212

Thelen, Ether
Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative – 311

Theodosopoulos, T V
A Hierarchical Algorithm for Neural Training and Control. Revision – 236

Thibodeau, Bryan J
Designing a Self-Stabilizing Robot for Dynamic Mobile Manipulation – 225

Thiers, E.
Methods and Apparatuses for Producing Metallic Compositions via Reduction of Metal Halides – 55

Thiesse, Monty
Energy and Utilities Readiness for the Army Industrial Activities – 133

Thom, Maxie C
Information Warfare Arms Control: Risks and Costs – 316

Thomas, Nicholas E.
Responding to Mechanical Antigravity – 37

Thompson, David J.
Future Gamma-Ray Observations of Pulsars and their Environments – 321

Thompson, J.
Monitoring of Interaction-Point Parameters Using the 3-Dimensional Luminosity Distribution Measured at Pep-II – 263

Thompson, K. A.
Trans-Texas Corridor and the Texas Airport System: Opportunities and Challenges – 11

Thorp, Sheryl F
Environmental Support to Space Launch – 30

Thrasher, Stephen W.
Comparison of Fixed and Variable Time Step Trajectory Integration Methods for Cislunar Trajectories – 231

Tian, G.
Thermodynamics of Neptunium(V) Fluoride and Sulfate at Elevated Temperatures – 51

Tian, Xiu-chun
Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity – 178

Tian, Y.
Mixed Mode Fuel Injector and Injection System – 114

Ultra-Hard Low Friction Coating Based on ALMGB14 for Reduced Wear on MEMS and Other Tribiological Components and System – 59

Tice, Jeffrey A
Soy and Tamoxifen for Breast Cancer Prevention in High Risk Pre-Menopausal Women – 171

Tigges, M.
NASA CEV Reference Entry GN&C System and Analysis – 21

Tigges, Michael
Numerical Skip-Entry Guidance – 32

Tin, C. C.
Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

Tinapple, Jon
Optimal Control of Shock Wave Turbulent Boundary Layer Interactions Using Micro-Array Actuation – 2

Tipps, D. O.
Statistical Loads Data for the Boeing 777-200ER Aircraft in Commercial Operations – 15

Tiwari, Vidhu S.
Fiber Optic Raman Sensor to Monitor Concentration Ratio of Nitrogen and Oxygen in a Cryogenic Mixture – 286

Tohme, Walid G
Workshop for Open Source Universal Picture Archiving and Communication Systems (PACS) – 110

Tolliver, J C
Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint) – 61

Tolson, Robert H.
Autonomous Aerobraking Using Thermal Response Surface Analysis – 34

Tombak, Ali
Radio Frequency Applications of Barium Strontium Titanate Thin Film Tunable Capacitors – 96

Tommasini, R.
High Energy X-Ray Imager for Inertial Confinment Fusion at the National Ignition Facility – 272

Multispectral X-Ray Imaging for Core Temperature and Density Maps Retrieval in Direct Drive Implosions – 272

Tomsick, John A.
Black Hole Spectral States and Physical Connections – 322

Torres, S. G.
Effect of Solution Annealing on Alloy 22 Weld Properties – 54

Torun, Y.
Muon Cooling RF R and D Program – 277

Tovornik, Boris
On-Line Fault Detection and Isolation Using Analytical Redundancy – 80

Traina, Agma
Tri-Plots: Scalable Tools for Multidimensional Data Mining – 308

Traina, Caetano
Tri-Plots: Scalable Tools for Multidimensional Data Mining – 308

Trainor, Timothy E
Risk-Based Decision Support of Water Resource Management Alternatives – 250

Tran, Van T.
Incorporation of Half-Cycle Theory Into Ko Aging Theory for Aerostructural Flight-Life Predictions – 121

Traum, D
Simulation Meets Hollywood: Integrating Graphics, Sound, Story and Character for Immersive Simulation – 200

Traum, David
Dealing with Out of Domain Questions in Virtual Characters – 219

Toward a New Generation of Virtual Humans for Interactive Experiences – 205

Trenholme, J. B.
Size Selection Initiation Model Extended to Include Shape and Random Factors – 197

Summary of Recent Damage-Initiation Experiments on KDP Crystals – 291

Treskunov, Anton
A Virtual Reality Exposure Therapy Application for Iraq War Post Traumatic Stress Disorder – 148

Trewyn, B. G.
Biological Applications and Transmission Electron Microscopy Investigation of Mesoporous Silica Nanoparticles – 48

Trost, andrej
Electrotechnical Review, Volume 73, No. 5 – 78

Trost, Andrej
Electrotechnical Review, Volume 73, No.4 – 75

Truong, T. V.
Dynamical Study of Guest-Host Orientational Interaction in Liquid Crystalline Materials – 51

Tsotsis, T. T.
Novel Anionic Clay Adsorbents for Boiler-Blow Down Waters Reclaim and Reuse. (Final Report, September 1, 2004-August 31, 2005) – 49

Tu, Wenli
Implementation of the Asthma Practice Guideline in the Army Medical Department: Evaluation of Process and Effects – 161

Tucker, W.
Sensitivity in Risk Analyses with Uncertain Numbers – 191

Tueller, Jack
The Swift/BAT Hard X-ray Survey – 321

Tulyani, Sonia
Solid Oxide Fuel Cell APU Feasibility Study for a Long Range Commercial Aircraft Using UTC ITAPS Approach – 22

Tung, L. S.
Pressure Model for the Vacuum System for the Electron Gun and Injector for LCLS Final Design Report – 271

Turon, Albert
Simulation of Delamination Propagation in Composites Under High-Cycle Fatigue by Means of Cohesive-Zone Models – 122

Turpin, Terry S.
Comanche Helmet-Mounted Display Symbology Simulation – 20

Turpin, Terry
Comanche Helmet-Mounted Display Heading-Tape Simulation – 20

Tuttle, Dave
Progress in Flaps Down Flight Reynolds Number Testing Techniques at the NTF – 12

Twiss, R Q
A Noise Theory for the Magnetron. I. The Temperature Limited Low Current Densit Magnetron – 83

Tygert, Mark
Diagonal Representation of Certain Matrices – 233

On Interpolation and Integration in Finite-Dimensional Spaces of Bounded Functions – 233

Tzolov, Marian
Template-Growth of Highly Ordered Carbon Nanotube Arrays on Silicon POST-PRINT – 53

Ugurlu, O.
Nature of the Distinctive Microscopic Features in R5(SIxGe1-x)4 Magnetic Refrigeration Materials – 38

Ui. Cjemg-ying
Development of Controlled Ecological Life-support System in Russia – 176

Uiam. Xoi-gam
Study on Modified Delphi Method as Used for Index Filtration in Ergonomic Evaluation of Cockpit Display – 176

Ullery, Duane
Energy and Utilities Readiness for the Army Industrial Activities – 133

Uppuluri, S.
Investigations of Performance of Pneumatic Deicing Boots, Surface Ice Detectors, and Scaling of Intercycle Ice – 2

Uribe, Tomas E
A Personalized Calendar Assistant – 311

Ustemirov, N.
Efficient Execution of Electronic Structure Calculations on SMP Clusters – 47

Vaelberg, S.
Positionering av Radiosaendare i Svar Radionmiljoe (Radio DF in Difficult Environment) – 68

Vaid, Ajula
The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer – 157

Vajtal, R.
Carbon Nanotube Filter – 41

Vala, John
A Comparison of the Detection Rates for Infrared and Visual Imagery of a Person Holdina an RPG – 109

Valaik, Daniel J
A Review of Manned Thermal Garment Diving Studies With Lessons Learned for the SDV Operator and Combat Swimmer – 299

Valanejad, K
Emotionally Evocative Environments for Training – 212

Valeriano
MEMS Microshutter for James Webb Space Telescope – 318

Valh, Drago
On-Line Fault Detection and Isolation Using Analytical Redundancy – 80

Van Ess-Dykema, Carol
When is an Embedded MT System ‘Good Enough’ for Filtering? – 308

van Lent, Michael
Applying Perceptually Driven Cognitive Mapping to Virtual Urban Environments – 229

Building Explainable Artificial Intelligence Systems – 223

Building Robust Planning and Execution Systems for Virtual Worlds – 203

Explainable Artificial Intelligence for Training and Tutoring – 220

Reflective Tutoring for Immersive Simulation – 220

van Velsen, Martin
Modeling Dynamic Perceptual Attention in Complex Virtual Environments – 200

Van Winkle, D.
Amplitude Linearizers for PEP-II 1.2 MW Klystrons and LLRF Systems – 294

Design and Testing of Gproto bunch-by-bunch Signal Processor – 294

Vana, Adam C
The Oligodendrocyte Progenitor Response to Demyelination – 151

Vashaee, D
Solid-State and Vacuum Thermionic Energy Conversion – 134

Vasserman, Alexander
Speed and Accuracy in Shallow and Deep Stochastic Parsing – 241

Vaughn, Jason A.
Electrodynamic Tether – 32

Vaupotic, Marko
Development of multi service provisioning platform in synchronous digital hierarchy systems – 199

Vavpotic, Damjan
Model-driven Architecture and Its Impact on the Software Development Process – 81

Vay, J. L.
New Simulation Capabilities of Electron Clouds in Ion Beams with Large Tune Depression – 279

Veedu, S. T.
High Tensile Strength Carbon Nanotube Film and Process for Making the Same – 293

Macroscopic Fiber Comprising Single-Wall Carbon Nanotubes and Acrylonitrile-Based Polymer and Process for Making the Same – 46

Velez, John C
An Analysis of Earned Value Management Implementation Within the F-22 System Program Office’s Software Development – 19

Venechuk, E. M.
Layered Sediments, Rampart Craters, and Potential Fluvio-Lacustrine Activity in S.W. Arabia Terra, Mars: Support for a History of Aqueous Conditions – 332

Venkatapaty, Ethiraj
Arcjet Semi-Elliptic Nozzle Simulations and Validation in Support of TPS Testing – 101

Venkatesh, S.
Electronic Device and Process for Forming Same – 90

Venturini, M.
Direct Space Charge Effects on the ILC Damping Rings: Task Force Report – 281

Space Charge and Equilibrium Emittances in Damping Rings – 273

Verghese, George C
Conditions for Scale-Based Decompositions in Singularly Perturbed Systems – 240

Optimally Robust Redundancy Relations for Failure Detection in Uncertain Systems – 216

Vernez, Georges
Implementation of the Asthma Practice Guideline in the Army Medical Department: Evaluation of Process and Effects – 161

Verver, P. M.
Communications System Based on Real-Time Neurophysiological Characterization – 70

Viaud, B. F.
Monitoring of Interaction-Point Parameters Using the 3-Dimensional Luminosity Distribution Measured at Pep-II – 263

Viaud, B.
Characterization of the Pep-II Colliding-Beam Phase Space by the Boost Method – 264

Viera, Janelle K
Using Computer Games to Train Information Warfare Teams – 208

Vietri, Nicholas J
Poly-gamma-Glutamate Capsule-Degrading Enzyme Treatment Enhances Phagocytosis and Killing of Encapsulated Bacillus Anthracis – 164

Villahermosa, Luis A
Corrosion Preventing Characteristics of Military Hydraulic Fluids. Part 2 – 57

Vina, Stephen
Border Security: Barriers Along the U.S. International Border – 116

Viswanathan, R.
Combustion Turbine (CT) Hot Section Coating Life Management. (Final Report) – 60

Vlahovic, B.
Study of the (sub Lambda)(sup 7)He Hypernucleus in Formalism of the Faddeev Equations – 277

Voevodin, A A
Molybdenum Disulfide as a Lubricant And Catalyst in Adaptive Nanocomposite Coatings (Preprint) – 53

Vogelsang, W.
Parton Orbital Angular Momentum – 262
QT-Reummation for Polarized Semi-Inclusive Deep Inelastic Scattering – 260
Threshold Resummation Effects in the Polarized Drell-Yan Process at GSI and J-PARC – 264

Volk, Mojca
Softswitch Architecture Remodelling for New Generation IP Multimedia Subsystem Environment – 79

vonRosenvinge, T. T.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Voss, Clare R
When is an Embedded MT System 'Good Enough' for Filtering? – 308

Wade, Courtney
UMass at TREC 2002: Cross Language and Novelty Tracks – 228
UMass at TREC 2003: HARD and QA – 312
UMass at TREC 2004: Novelty and HARD – 310

Wade, Katherine
A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series – 10
Index to FAA Office of Aerospace Medicine Reports: 1961 through 2004 – 17

Wal, Randy L. Vander
Application of Carbon Based Nano-Materials to Aeronautics and Space Lubrication – 113

Wall, M. A.
Isothermal (Delta)/(Alpha-Prime) Transformation and TTT Diagram in a Plutonium Gallium Alloy – 38

Wallace, G.
Ionic Solvents Used in Ionic Polymer Transducers, Sensors and Actuators – 41

Walter, Diane
Operational Interventions to Maintenance Error – 5

Walton, C. M.
Evaluation and Integration of Texas Airports into the Trans-Texas Corridor, Project Summary – 8
Trans-Texas Corridor and the Texas Airport System: Opportunities and Challenges – 11

Walton, C.
MEMS Actuated Deformable Mirror – 259

Wambach, P. F.
Statistical Methods and Software for the Analysis of Occupational Exposure Data with Non-Detectable Values – 242

Wang, Chun-hui
Simulation Study on Performance of Control by Man and Machine in the Stage of Final Approaching for Rendezvous and Docking – 175

Wang, Hong
Protection Effects of a New Combined Anti-G Measure – 174

Wang, Jian
sEMG Dynamics of Muscle Fatigue Induced by Maximal Voluntary Isometric Contractions – 176

Wang, Jianghua
The Expression of Sprouty1, an Inhibitor of Fibroblast Growth Factor Signal Transduction, Is Decreased in Human Prostate Cancer – 157

Wang, Jun
Development of Controlled Ecological Life-support System in Russia – 176

Wang, L. W.
Survey of Codes and Algorithms Used in NERSC Material Science Allocations – 188

Wang, L.
Ion Effects in the Electron Damping Ring of the International Linear Collider – 295
Mixed Mode Fuel Injector and Injection System – 114
Perfect Electrode to Suppress Secondary Electrons Inside the Magnets – 278

Wang, Li
Study on Operational Reliability of Astronaut in Spacecraft Cabin – 178

Wang, Qin
Research on ECG Denoising during Spaceflight – 177

Wang, Xian-min
Space Medicine and Medical Engineering, Volume 19, No. 5 – 174

Wang, Xiao-hu
Effects of Irradiation with Different Dose Rates of X-ray on Mouse Immune System – 177

Wang, Xiao-xia
Development of a Complex Experimental System for Studies of Controlled Ecological Life Support Technique – 175

Wang, Zheng
Study on Operational Reliability of Astronaut in Spacecraft Cabin – 178

Wang, Zhi-kui
Space Medicine and Medical Engineering, Volume 19, No. 5 – 174

Wang, Zhi-yong
Protective Effects of Vitamin E on Injury to Male Reproductive Function in Tail-suspended Rats – 179

Ware, C.
Motion-Based Visualization, Part One – 197
Motion-Based Visualization, Part Two – 196

Warnes, Gregory R
HYDRA: A Java Library for Markov Chain Monte Carlo – 244

Warren, L. E.
A Hypothetical Perspective on the Relative Contributions of Strategic and Adaptive Control Mechanisms in Plastic Recalibration of Locomotor Heading Direction – 155
Development of Training Programs to Optimize Planetary Ambulation – 179

Warren, Lewis
Structural Uncertainties in Numerical Induction Models – 240

Watanabe, S.
X-Ray Spectral Study of the Photoionized Stellar Wind in Vela X-1 – 324

Waterman, D.
Novel Chamber Design for an In-Vacuum Cryo-Cooled Mini-Gap Undulator – 274

Waters, C. Z.
Luminosity Function of Faint Globular Clusters in M87 – 324

Watkins, Anthony Neal
Carbon Nanotube Based Light Sensor – 78

Watson, N. K.
Direct Measurement of Geometric and Resistive Wakefields in Tapered Collimators for the International Linear Collider – 267

Watson, W.
Efficient Subtorus Processor Allocation in a Multi-Dimensional Torus – 197

Wayda, Michael E
Index to FAA Office of Aerospace Medicine Reports: 1961 through 2004 – 17

Weaver, M.
Characterization of the Pep-II Colliding-Beam Phase Space by the Boost Method – 264

Weber, Christoph
Energy Assessment Strategy and Energy Concepts for Industrial Facilities – 135

Weeks, ichael W.
Comparison of Fixed and Variable Time Step Trajectory Integration Methods for Cislunar Trajectories – 231

Wehrensy, Ron
Incremental Model-Based Clustering for Large Datasets With Small Clusters – 254

Wei, J.
Experimental Studies of IBS in RHIC and Comparison with Theory – 262
Summary of Beam Cooling and Intra-beam Scattering – 261

Wei, Kung-Hwa
Spatial Position Control of CdS Nanoclusters using a Self-Assembled Diblock Copolymer Template – 62

Weigel, Annalisa
Fractionated Spacecraft Architectures Seeding Study – 30

Weintraub, Mitchel
Microphone-Independent Robust Signal Processing Using Probabilistic Optimum Filtering – 241

Weiss, C.
Transverse Imaging of the Proton in Exclusive Diffractive PP Scattering – 279

Weissman, Cheryl
Defense Infrastructure: Continuing Challenges in Managing DOD Lodging Programs as Army Moves to Privatize Its Program – 122

Welch, Rick
Solid Oxide Fuel Cell APU Feasibility Study for a Long Range Commercial Aircraft Using UTC ITAPS Approach – 22

Welkos, S L
Fully Virulent Bacillus Anthracis Does Not Require the Immunodominant Protein BclA for Pathogenesis – 164

Welling, Douglas M
Crawler Control Strategies and Their Influence on Mine Finding Capabilities – 222

Welser, L. A.
Multispectral X-Ray Imaging for Core Temperature and Density Maps Retrieval in Direct Drive Implosions – 272

Welzyn, Kenneth J.
Electrodynamic Tether – 32

Wen, J.
Tem Mems Device Holder and Method of Fabrication – 93

Wendelin, T.
Parabolic Trough VSHOT Optical Characterization in 2005-2006 – 129

Weng, Juyang
Computational Autonomous Mental Development: A White Paper for Suggesting a New Initiative – 311

Weng, W. T.
Comparative Studies of Proton Accelertors for High Power Applications – 275

Werf, R J van der
Virtual Rapport – 218

West, Katie J.
A Dynamic/Anisotropic Low Earth Orbit (LEO) Ionizing Radiation Model – 334

West, Paul D
Risk-Based Decision Support of Water Resource Management Alternatives – 250

Westheimer, David
Active Thermal Control System Development for Exploration – 327

Westrick, Kenneth
Calibrated Probabilistic Forecasting at the Stateline Wind Energy Center: The Regime-Switching Space-Time (RST) Method – 147

Weyburne, D
Aluminum Nitride Substrate Growth by Halide Vapor Transport Epitaxy – 53

Wheeler, Mark
Objective Lightning Probability Forecasting for Kennedy Space Center and Cape Canaveral Air Force Station – 141

White, D. A.
Parallel Computer Implementation of Fast Low-Rank QR Approximation of the Biot-Savart Law – 188

White, G. S.
Trends and Opportunities in Photonics Technologies: Solid-State Lighting and Healthcare – 87

White, R.
Tariff Analysis Project: A Database and Analysis Platform for Electrictiy Tariffs – 306

Whitesides, R.
Graphene Layer Growth: Collision of Migrating Five-Member Rings – 52

Whitlow, S. D.
Communications System Based on Real-Time Neurophysiological Characterization – 70

Whitman, William B.
Trichococcus Patagoniensis sp. nov., a Facultative Anaerobe that grows at -5 C, Isolated from Penguin Guano in Chilean Patagonia – 155

Whitmore, R. W.
Postsecondary Institutions in the USA: Fall 2005 and Degrees and Other Awards Conferred: 2004-05. First Look – 304

Widman, F. J.
Technology Development Program for an Advanced Potassium Rankine Power Conversion System Compatible with Several Space Reactor Designs – 27

Wiedenbeck, M. E.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Wilcox, Sara
The Effect of a Home-Based Walking Intervention on Quality of Life, Body Composition, and Estrogen Metabolism in Postmenopausal Breast Cancer Survivors – 169

Wilford, G
Using Human Systems Integration and Knowledge Engineering to Define and Design Anti-Terrorism/Force Protection Systems and Solutions – 183

Williams, Andrew D
Issues and Implications of the Thermal Control System on Responsive Space Missions – 29

Williams, Frederick W
User Manual for Graphical User Interface Version 2.4 with Fire and Smoke Simulation Model (FSSIM) Version 1.2 – 208

Williams, Geoffrey T
Developing an Inflatable Solar Array – 31

Williams, Jim
Pressure Effects on Oxygen Concentration Flammability Thresholds of Materials for Aerospace Applications – 35

Williams, Jonathan H
Multipath Mitigation Performance of Planar GPS Adaptive Antenna Arrays for Precision Landing Ground Stations – 95

Williams, Josh
Development of a Data Management Tool for Investigating Multivariate Space and Free Will Experiences in Virtual Reality – 201

Human Emotional State and its Relevance for Military VR Training – 202

The Fidelity of ‘Feel’: Emotional Affordance in Virtual Environments – 203

Williams, Kevin W
A Summary of Unmanned Aircraft Accident/Incident Data: Human Factors Implications – 10

Williams, Kimberly P
Passive Badge Assessment for Long-Term, Low-Level Air Monitoring on Submarines: VOC Badge Validation – 44

Williams, R.
Inclusion of Nitrogen at the Silicon Dioxide-Silicon Carbide Interface for Passivation of Interface Defects – 93

Williamson, Donald A
Weight Measurements and Standards for Soldiers – 165

Williamson, Jr, Richard E
C-17A Special Operations Low Level II (SOLL II) Supporting the Combatant Commander – 13

Willingham, Charles
Transparent Yttria for IR Windows and Domes - Past and Present – 292

Willsky, A S
A Wavelet-Based Method for Multiscale Tomographic Reconstruction – 256

Multiresolution Optimal Interpolation and Statistical Analysis of Topex/Poseidon Satellite Altimetry – 238

Multiscale Representations of Markov Random Fields – 243

Willsky, Alan S
A Wavelet Packet Approach to Transient Signal Classification – 283

Conditions for Scale-Based Decompositions in Singularly Perturbed Systems – 240

Efficient Multiscale Regularization with Applications to the Computation of Optical Flow – 106

Fractal Estimation using Models on Multiscale Trees – 238

Multiscale Representations of Markov Random Fields – 247

Observability of Discrete Event Dynamic Systems. Revision – 183

Optical Flow Computation via Multiscale Regularization – 98

Optimally Robust Redundancy Relations for Failure Detection in Uncertain Systems – 216

Wilson, D. G.

Energy Sustainability – 262

Wilson, F. F.

Recent tau Physics Studies at BABAR – 263

Wilson, George

MiTAP for Bio-Security: A Case Study – 311

Wilson, John W.

A Dynamic/Anisotropic Low Earth Orbit (LEO) Ionizing Radiation Model – 334

Wiltzius, D.

Certification of Completion of Level-2 Milestone 461: Deploy First Phase of I/O Infrastructure for Purple – 260

Wincheski, russell A.

Carbon Nanotube Based Light Sensor – 78

Winkowski, D

XML-Native Constraint Evaluation – 253

Witus, Gary

Intelligent Mobility Laboratory – 66

Wohlever, Steve

MiTAP for Bio-Security: A Case Study – 311

MiTPA for Real Users, Real Data, Real Problems – 307

Wojcik, M. D.

FY 2005 Quantum Cascade Laser Alignment System. Final Report – 289

Wolski, A.

Intrabeam Scattering in the NLC Main Damping Rings – 270

Ion Effects in the Electron Damping Ring of the International Linear Collider – 295

Space Charge and Equilibrium Emittances in Damping Rings – 273

Wong, L. L.

Methods to Calculate Corrosion Rates for Alloy 22 from Polarization Resistance Experiments – 49

Wong-Ng, W

Flux Pinning and Properties of Solid-Solution (Y,Nd)1+XBa2-x Cu3O7-delta Superconductors Processed in Air and Partial Oxygen Atmospheres (Preprint) – 61

Woods, M.

Comparison of 2 mrad and 14/20 mrad Crossing Angle Extraction Lines – 296

Woodward, C

Virtual Design and Testing of Materials: A Multiscale Approach – 40

Worrell, E.

Sectoral Trends in Global Energy Use and Greenhouse Gas Emissions – 143

Wright, A. A.

Characterization of Lubricants on Ball Bearings by FT-IR Using an Integrating Sphere – 52

Wronski, Thomas J

Central Leptin Gene Therapy to Reduce Breast Cancer Risk Factors – 166

Wu, Chang-li

Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity – 178

Wu, Jia-long

Design of a Wearable Respiratory Inductive Plethysmograph and Its Applications – 178

Wu, K.

HDF5-Fast Query: An API for Simplifying Access to Data Storage, Retrieval, Indexing and Querying – 302

Wu, Shuenn-Jue

Enhancing the Immunogenicity of a Dengue-2 DNA Vaccine with Adjuvants and Anti-Fc(gamma)RI Antibodies – 163

Wu, Su-di

Prophylactic Effects of Choline Chloride on Muscle Atrophy in Tail-suspended Rats – 177

Wu, Tai-hu

Design of a Wearable Respiratory Inductive Plethysmograph and Its Applications – 178

Wu, Tsung-Lun

Spatial Position Control of CdS Nanoclusters using a Self-Assembled Diblock Copolymer Template – 62

Wu, Xiao-mei

Fitting APD Restitution with Artificial Neural Network – 174

Wu, Xingxing

Enhancement of Stochastic Resonance by Tuning System Parameters and Adding Noise Simultaneously – 248

Enhancement of Stochastic Resonance Using Optimization Theory – 249

Wunsch, C

Multiresolution Optimal Interpolation and Statistical Analysis of Topex/Poseidon Satellite Altimetry – 238

Wurster, Kathryn E.

A Simplified Approach for the Rapid Generation of Transient Heat-Shield Environments – 34

Xhakouri, Ali

The Effect of Temperature on the Resonant Tunneling and Electric Field Domain Formation in Multiple Quantum Well Superlattices – 296

Xia, Y.

Thermodynamics of Neptunium(V) Fluoride and Sulfate at Elevated Temperatures – 51

Xie, Yi

Effects of Irradiation with Different Dose Rates of X-ray on Mouse Immune System – 177

Xing, Jing

Complexity and Automation Displays of Air Traffic Control: Literature Review and Analysis – 11

Xu, Jimmy

Template-Growth of Highly Ordered Carbon Nanotube Arrays on Silicon POSTPRINT – 53

Xu, Run-tao

Study on Operational Reliability of Astronaut in Spacecraft Cabin – 178

Xu, Weihua

Direct Measurement of Population-Induced Broadening of Quantum Well Intersubband Transitions – 284

Xu, Yan

Protection Effects of a New Combined Anti-G Measure – 174

Xu, Y

Control of Electric Field Domain Formation in Multiquantum Well Structures – 281

Xu, Yuanjian

Direct Measurement of Population-Induced Broadening of Quantum Well Intersubband Transitions – 284

Quantum Interference Effect and Electric Field Domain Formation in Quantum Well Infrared Photodetectors – 109

The Effect of Temperature on the Resonant Tunneling and Electric Field Domain Formation in Multiple Quantum Well Superlattices – 296

Yamada, Kenji

Fast Decoding and Optimal Decoding for Machine Translation – 239

Yamaguchi, M.

Characterization of Materials with Optically Shaped Acoustic Waveforms – 272

Yamanis, Jean

Solid Oxide Fuel Cell APU Feasibility Study for a Long Range Commercial Aircraft Using UTC ITAPS Approach – 22

Yan, Gui-ding

Protection Effects of a New Combined Anti-G Measure – 174

Yan, Hong

Research on ECG Denoising during Spaceflight – 177

Yanasak, N. E.
Observations of the Li, Be, and B Isotopes and Constraints on Cosmic-ray Propagation – 324

Yang, Chengfeng
Effect of Chimaerins, Novel Receptors for Phorbol Esters, on Breast Cancer Cell Proliferation and Cell Cycle Progression – 165

Yang, Chieh
Process Improvement at the Aircraft Intermediate Maintenance Detachment (AIMD) at Naval Air Station Whidbey Island – 5

Yang, Chun-xin
Research of Biomechanical Evaluation Methods of Hand Performance Fatigue – 178

Yang, Cui-wei
Fitting APD Restitution with Artificial Neural Network – 174

Yang, Feng
Research of Biomechanical Evaluation Methods of Hand Performance Fatigue – 178

Yang, Tung-Sheng
Performance Analysis of Adaptive Transmission Aided by Long Range Channel Prediction for Realistic Single- and Multi-Carrier Mobile Radio Channels – 71

Yang, Xiang-zhong
Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity – 178

Yang, Xinhai
The Role of AhR in Breast Cancer Development – 166

Yang, Zhen
sEMG Dynamics of Muscle Fatigue Induced by Maximal Voluntary Isometric Contractions – 176

Yardley, Thomas E
The Development of a Logistical Body of Knowledge for the Department of Defense – 313

Yariv, A
Control of Electric Field Domain Formation in Multiquantum Well Structures – 281

Performance Improvement in Quantum Well Lasers by Optimizing Band Gap Offset at Quantum Well Heterojunctions – 111

Sub-100 muA Current Operation of Strained InGaAs Quantum Well Lasers at Low TemperaturesL – 111

Voltage-Controlled Tunable GaAs/AlGaAs Multistack Quantum Well Infrared Detector – 108

Yariv, Amnon
Direct Measurement of Population-Induced Broadening of Quantum Well Intersubband Transitions – 284

Quantum Interference Effect and Electric Field Domain Formation in Quantum Well Infrared Photodetectors – 109

The Effect of Temperature on the Resonant Tunneling and Electric Field Domain Formation in Multiple Quantum Well Superlattices – 296

Yashiki, T.
Comparative Corrosion Behavior of Two Palladium-Containing Titanium Alloys – 50

Yeh, Siao-Wei
Spatial Position Control of CdS Nanoclusters using a Self-Assembled Diblock Copolymer Template – 62

Yerger, John M
Aircraft Fuel Cell Repair Equipment (AFCRE) – 17

Yeung, Ka Yee
Robust Estimation of cDNA Microarray Intensities with Replicates – 245

Yildirim, Y.
Performance Comparison of Hot Rubber Crack Sealants to Emulsified Asphalt Crack Sealants – 42

Yin, Aijun
Template-Growth of Highly Ordered Carbon Nanotube Arrays on Silicon POSTPRINT – 53

Yin, Yong-li
Development of a Complex Experimental System for Studies of Controlled Ecological Life Support Technique – 175

Yoda, K
Magnetization Losses in Multifilament Coated Superconductors (Postprint) – 280

Yoder, G. L.
Scaling of Thermal-Hydraulic Experiments for a Space Ranking Cycle and Selection of a Preconceptual Scaled Experiment Design – 285

Technology Development Program for an Advanced Potassium Rankine Power Conversion System Compatible with Several Space Reactor Designs – 27

Yokota, Miyo
Transient Sweat Rate Calculation from Humidity Measurements Under Clothing – 297

Yokoya, H.
Threshold Resummation Effects in the Polarized Drell-Yan Process at GSI and J-PARC – 264

Young, B.
High Energy X-Ray Imager for Inertial Confinment Fusion at the National Ignition Facility – 272

Young, D. T.
Titan Ion Composition at Magnetosphere-Ionosphere Transition Region – 332

Yu, Meng-sun
Design of a Wearable Respiratory Inductive Plethysmograph and Its Applications – 178

Yu, S. S.
Ion Motion in the Adiabatic Focuser – 296

Yuan, X.
Sensor Networking Testbed with IEEE 1451 Compatibility and Network Performance Monitoring – 213

Yuan, Xiu-gan
Research of Biomechanical Evaluation Methods of Hand Performance Fatigue – 178

Yueh, Fang-Yu
Fiber Optic Raman Sensor to Monitor Concentration Ratio of Nitrogen and Oxygen in a Cryogenic Mixture – 286

Yukon, Stanford P
A Multi-Josephson Junction Qubit – 298

Josephson Junction Triangular Prism Qubits Coupled to a Resonant LC Bus: Qubits and Gates for a Holonomic Quantum Computer – 96

Zagorodnov, I.
Wakefield Calculations for 3D Collimators – 295

Wakefields in the LCLS Undulator Transitions – 295

Zajc, Baldomir
Electrotechnical Review, Volume 73, No. 5 – 78

Electrotechnical Review, Volume 73, No.4 – 75

Zavaliagkos, G
Continuous Speech Recognition Using Segmental Neural Nets – 74

Zavaliagkos, George
Is N-Best Dead? – 241

Zavaliagkost, G
Improving State-of-the-Art Continuous Speech Recognition System Using the N-Best Paradigm with Neural Networks – 74

Zehner, D. M.
Devices with Small-Scale Channels and the Fabrication Thereof by Etching – 89

Zeitlin, A.
Collision Avoidance for Unmanned Aircraft: Proving the Safety Case – 6

Zemva, Andrej
Development of multi service provisioning platform in synchronous digital hierarchy systems – 199

Zeng, G
Solid-State and Vacuum Thermionic Energy Conversion – 134

Zentz, S.
Global, Multi-Year Analysis of Clouds and Earth's Radiant Energy System Terra Observations and Radiative Transfer Calculations – 142

Zepf, S. E.
Luminosity Function of Faint Globular Clusters in M87 – 324

Zhang, Hai-hong
sEMG Dynamics of Muscle Fatigue Induced by Maximal Voluntary Isometric Contractions – 176

Zhang, Hong
Effects of Irradiation with Different Dose Rates of X-ray on Mouse Immune System – 177

Zhang, Jie
Protective Effects of Vitamin E on Injury to Male Reproductive Function in Tail-suspended Rats – 179

Zhang Li-fan
Effects of Tail Suspension on Renin-angiotensin System in Rat Myocardium – 176

Zhang, Li-fan
Protection Effects of a New Combined Anti-G Measure – 174

Zhang, Li-hui
Protection Effects of a New Combined Anti-G Measure – 174

Zhang, M.
Tem Mems Device Holder and Method of Fabrication – 93

Zhang, Shou-quan
Development of Kunming Mouse Early Embryos in Vitro and Expression of G6PD under Simulated Microgravity – 178

Zhang, Xiaolei
Design Considerations for the Second-Generation NPOI Fringe Tracker and Science Beam Combiner – 292

Zhang, Y
Solid-State and Vacuum Thermionic Energy Conversion – 134

Zhang, Zheng-Bo
Design of a Wearable Respiratory Inductive Plethysmograph and Its Applications – 178

Zhang, Zhongfei
On Developing Theory and Application of Community Generation – 256

Zhao, B
Performance Improvement in Quantum Well Lasers by Optimizing Band Gap Offset at Quantum Well Heterojunctions – 111

Sub-100 muA Current Operation of Strained InGaAs Quantum Well Lasers at Low TemperaturesL – 111

Zhao, G L
Predictive Computations of Properties of Wide-Gap and Nano-Semiconductors – 100

Zhao, Ying
Is N-Best Dead? – 241

Zheng, James
Use of a Spacer Vest to Increase Evaporative Cooling Under Military Body Armor – 297

Zhnag, X.
High Tensile Strength Carbon Nanotube Film and Process for Making the Same – 293

Zhou, Dang-xia
Protective Effects of Vitamin E on Injury to Male Reproductive Function in Tail-suspended Rats – 179

Zhou, Qian-xiang
Simulation Study on Performance of Control by Man and Machine in the Stage of Final Approaching for Rendezvous and Docking – 175

Zhu, Jing-tao
Development of a Complex Experimental System for Studies of Controlled Ecological Life Support Technique – 175

Zhuang, Y H
Sub-100 muA Current Operation of Strained InGaAs Quantum Well Lasers at Low TemperaturesL – 111

Zide, J M
Solid-State and Vacuum Thermionic Energy Conversion – 134

Zmud, J.
Federal Building and Fire Safety Investigation of the World Trade Center Disaster: Technical Documentation for Survey Administration. Questionnaires, Interviews, and Focus Groups. NIST NCSTAR 1-7B – 119

Zoby, E. Vincent
A Simplified Approach for the Rapid Generation of Transient Heat-Shield Environments – 34

Zolensky, M. E.
A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 328

Zolensky, Michael E.
In-situ micro-FTIR Study of Thermal Changes of Organics in Tagish Lake Meteorite: Behavior of Aliphatic Oxygenated Functions and Effects of Minerals – 328

The Origin of Dark Inclusions in Allende: New Evidence from Lithium Isotopes – 330

Zucker, K W
Foundations in the Law: Classic Cases in Medical Ethics – 159

Zue, Victor
Experiments in Evaluating Interactive Spoken Language Systems – 315

Zunko, Peter
Analysis of Industrial Power Networks – 80

Zywiol, Jr, Harry J
A Ground Vehicle Simulation Design to Study Driver Display Concepts – 64