National Aeronautics and Space Administration
Langley Research Center
Scientific and Technical Information Program Office

Scientific and Technical Aerospace Reports

STAR

Volume 45 Number 15

August 6, 2007

WHAT'S INSIDE

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

NASA STI Program ... in Profile

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

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

- TECHNICAL PUBLICATION. Reports of completed research or a major significant phase of research that present the results of NASA Programs and include extensive data or theoretical analysis. Includes compilations of significant scientific and technical data and information deemed to be of continuing reference value. NASA counterpart of peer-reviewed formal professional papers but has less stringent limitations on manuscript length and extent of graphic presentations.

- TECHNICAL MEMORANDUM. Scientific and technical findings that are preliminary or of specialized interest, e.g., quick release reports, working papers, and bibliographies that contain minimal annotation. Does not contain extensive analysis.

- CONTRACTOR REPORT. Scientific and technical findings by NASA-sponsored contractors and grantees.

- CONFERENCE PUBLICATION. Collected papers from scientific and technical conferences, symposia, seminars, or other meetings sponsored or co-sponsored by NASA.

- SPECIAL PUBLICATION. Scientific, technical, or historical information from NASA programs, projects, and missions, often concerned with subjects having substantial public interest.

- TECHNICAL TRANSLATION. English-language translations of foreign scientific and technical material pertinent to NASA's mission.

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

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

- Access the NASA STI program home page at http://www.sti.nasa.gov

- E-mail your question via the Internet to help@sti.nasa.gov

- Fax your question to the NASA STI Help Desk at (301) 621-0134

- Phone the NASA STI Help Desk at (301) 621-0390

- Write to:
  NASA STI Help Desk
  NASA Center for AeroSpace Information
  7115 Standard Drive
  Hanover, MD 21076-1320

Introduction

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

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

STAR includes citations to R&D results reported in:

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

The NASA STI Program

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

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

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

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

NASA STI Availability Information

NASA Center for AeroSpace Information (CASI)

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

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

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

National Technical Information Service (NTIS)

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

The Federal Depository Library Program (FDLP)

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

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

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

Table of Contents

Subject Divisions/Categories

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

Aeronautics

03 Air Transportation and Safety 1
05 Aircraft Design, Testing and Performance 5
06 Avionics and Aircraft Instrumentation 7
08 Aircraft Stability and Control 8

Astronautics

14 Ground Support Systems and Facilities (Space) 9
17 Space Communications, Spacecraft Communications, Command and Tracking 9
18 Spacecraft Design, Testing and Performance 10
19 Spacecraft Instrumentation and Astrionics 12
20 Spacecraft Propulsion and Power 12

Chemistry and Materials

24 Composite Materials 14
25 Inorganic, Organic and Physical Chemistry 17
26 Metals and Metallic Materials 18
27 Nonmetallic Materials 19
28 Propellants and Fuels 19

Engineering

32 Communications and Radar 20
33 Electronics and Electrical Engineering 20
34 Fluid Mechanics and Thermodynamics 23
36 Lasers and Masers 26
37 Mechanical Engineering 26

Geosciences

43 Earth Resources and Remote Sensing 28
45 Environment Pollution 31
46 Geophysics 31
47 Meteorology and Climatology 32

Life Sciences

51 Life Sciences (General) 34
52 Aerospace Medicine 38
53 Behavioral Sciences 74
54 Man/System Technology and Life Support 75
55 Exobiology 76

Mathematical and Computer Sciences

61 Computer Programming and Software 77
64 Numerical Analysis 78
65 Statistics and Probability 78

Physics

71 Acoustics 79
72 Atomic and Molecular Physics 80
74 Optics 80

Space Sciences

89 Astronomy 80
90 Astrophysics 81
91 Lunar and Planetary Science and Exploration 82
93 Space Radiation 85

Indexes

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

Subject Term Index

Personal Author Index

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS

A Biweekly Publication of the National Aeronautics and Space Administration

VOLUME 45, NUMBER 15 AUGUST 6, 2007

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.

20070022340 NASA Dryden Flight Research Center, Edwards, CA, USA

Data Modeling and Sharing Perspective for Development of a Common Operating Picture

[2007]; 99 pp.; In English; Original contains color illustrations

Report No.(s): IMP002; Copyright; Avail.: CASI: A05, Hardcopy

This report documents analyses that were performed in support of Task #3 of Work Package #3 (WP3), ROA Impact on the NAS. The purpose of the overall work package was to determine if there are any serious issues that would prevent or prohibit ROA's flying in the NAS on a routine basis, and if so, what actions should be taken to address them. The purpose of Task #3 was to look at this problem from the perspective of data modeling and sharing.

Author

National Airspace System; Air Transportation; Flight Operations; Automation; Data Processing; Models

20070022341 NASA Dryden Flight Research Center, Edwards, CA, USA

High Altitude Long Endurance Remotely Operated Aircraft - National Airspace System Integration - Simulation IPT: Detailed Airspace Operations Simulation Plan. Version 1.0

Sep. 30, 2004; 46 pp.; In English; Original contains color illustrations

Report No.(s): SIM001; Copyright; Avail.: CASI: A03, Hardcopy

The primary goal of Access 5 is to allow safe, reliable and routine operations of High Altitude-Long Endurance Remotely Operated Aircraft (HALE ROAs) within the National Airspace System (NAS). Step 1 of Access 5 addresses the policies, procedures, technologies and implementation issues of introducing such operations into the NAS above pressure altitude 40,000 ft (Flight Level 400 or FL400). Routine HALE ROA activity within the NAS represents a potentially significant change to the tasks and concerns of NAS users, service providers and other stakeholders. Due to the complexity of the NAS, and the importance of maintaining current high levels of safety in the NAS, any significant changes must be thoroughly evaluated prior to implementation. The Access 5 community has been tasked with performing this detailed evaluation of routine HALE-ROA activities in the NAS, and providing to key NAS stakeholders a set of recommended policies and procedures to achieve this goal. Extensive simulation, in concert with a directed flight demonstration program are intended to provide the required supporting evidence that these recommendations are based on sound methods and offer a clear roadmap to achieving safe, reliable and routine HALE ROA operations in the NAS. Through coordination with NAS service providers and policy makers, and with significant input from HALE-ROA manufacturers, operators and pilots, this document presents the detailed simulation plan for Step 1 of Access 5. A brief background of the Access 5 project will be presented with focus on Steps 1 and 2, concerning HALE-ROA operations above FL400 and FL180 respectively. An overview of project management structure follows with particular emphasis on the role of the Simulation IPT and its relationships to other project entities. This discussion will include a description of work packages assigned to the Simulation IPT, and present the specific goals to be achieved for each simulation work package, along with the associated deliverables necessary to achieve these goals and the needs of other Access 5 IPTs. The simulation environment chosen for this task is then outlined. This section includes a description of the system architecture, a list of the necessary assumptions made by the Simulation IPT, and the roles, responsibilities and interactions of simulation participants. The method of simulation conduct is presented in the next section with particular emphasis on scenario development and applicability to evaluation of Step 1 HALE-ROA operations.

Following, data collection and analysis methods are discussed for air traffic specialists and air vehicle control station operators. Lastly, a schedule of Step 1 simulation activities is presented for reference.
Derived from text
National Airspace System; Computerized Simulation; Flight Plans; Flight Operations; Systems Integration

20070022346 Embry-Riddle Aeronautical Univ., USA, NASA Dryden Flight Research Center, Edwards, CA, USA
The Ground Control Room as an Enabling Technology in the Unmanned Aerial System
Gear, Gary; Mace, Thomas; May 09, 2007; 13 pp.; In English; ASPRS 2007 Annual Conference, 7-11 May 2007, Tampa, FL, USA; Original contains color illustrations; Copyright; Avail.: CASI: A03, Hardcopy

This viewgraph presentation reviews the development of the ground control room as an required technology for the use of an Unmanned Aerial system. The Unmanned Aerial system is a strategic component of the Global Observing System, which will serve global science needs. The unmanned aerial system will use the same airspace as manned aircraft, therefore there will be unique telemetry needs.
CASI
Flight Control; In-Flight Monitoring; Pilotless Aircraft; Remotely Piloted Vehicles; Ground Stations; Ground Based Control

20070022347 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
Relationship of Complexity Factor Ratings with Operational Errors
Pfleiderer, Elaine M.; Manning, Carol A.; Goldman, Scott M.; May 2007; 18 pp.; In English
Report No.(s): DOT/FAA/AM-07/11; No Copyright; Avail.: CASI: A03, Hardcopy

This study is an examination of the extent to which objective static sector characteristics and controller ratings of static and dynamic sector complexity factors contributed to the occurrence of operational errors (OEs) at the Indianapolis air route traffic control center (ZID). A multiple regression model of the relationship between a combination of static sector characteristics (sector altitude strata and sector size) resulted in a modest prediction of the variance in OE incidence (R = .70, R(sup2) = .49). Sector size was negatively related to OEs, indicating that smaller sectors were associated with more OEs. Sector strata were positively related to OEs, indicating that higher altitude sectors were associated with more OEs. Principal Components Analysis (PCA) of the complexity ratings produced four components with eigenvalues >1.00, accounting for 62% of the variance in the data. Components were used as predictors in a multiple regression analysis of the number of OEs in the ZID sectors. Only Component 1 (climbing and descending aircraft in the vicinity of major airports) and Component 2 (services provided to non-towered airports) contributed significantly to the total proportion of variance explained by the model (R = .78, R(sup2) = .61). Component 2 shared an inverse relationship with the number of OEs, indicating that the complexity related to providing services to non-towered airports is associated with fewer OEs. These results will be used to guide the choice of objective measures for further analysis of the influence of static and dynamic sector characteristics in the occurrence of OEs.
Author
Air Traffic Control; Static Characteristics; Principal Components Analysis; Dynamic Characteristics; Selection; Regression Analysis; Errors; Predictions

20070022348 NASA Dryden Flight Research Center, Edwards, CA, USA
Flight Test Results from the NF-15B Intelligent Flight Control System (IFCS) Project with Adaptation to a Simulated Stabilator Failure
Bosworth, John T.; Williams-Hayes, Peggy S.; May 07, 2007; 18 pp.; In English; Infotech\@Aerospace 2007 Conference and Exhibit, 7-10 May 2007, Rohnert Park, CA, USA; Original contains color illustrations
Report No.(s): AIAA-2007-2818; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022348

Adaptive flight control systems have the potential to be more resilient to extreme changes in airplane behavior. Extreme changes could be a result of a system failure or of damage to the airplane. A direct adaptive neural-network-based flight control system was developed for the National Aeronautics and Space Administration NF-15B Intelligent Flight Control System airplane and subjected to an inflight simulation of a failed (frozen) (unmovable) stabilator. Formation flight handling qualities evaluations were performed with and without neural network adaptation. The results of these flight tests are presented. Comparison with simulation predictions and analysis of the performance of the adaptation system are discussed. The performance of the adaptation system is assessed in terms of its ability to decouple the roll and pitch response and reestablish good onboard model tracking. Flight evaluation with the simulated stabilator failure and adaptation engaged showed that there

was generally improvement in the pitch response; however, a tendency for roll pilot-induced oscillation was experienced. A detailed discussion of the cause of the mixed results is presented.
Author
Flight Control; Adaptive Control; In-Flight Simulation; Flight Simulation; Controllability; System Failures; NASA Programs

20070022527 Nebraska Univ., Omaha, NE, USA
Journal of Air Transportation, Volume 11, No. 3
Bowen, Brent, Editor; Kabashkin, Igor, Editor; Fink, Mary, Editor; January 2007; ISSN 1544-6980; In English; See also 20070022528 - 20070022533
Contract(s)/Grant(s): NNG05GJ03H
Report No.(s): LC-HE9761.1.J68; Copyright; Avail.: Other Sources

The mission of the Journal of Air Transportation (JAT) is to provide the global community immediate key resource information in all areas of air transportation. The goal of the Journal is to be recognized as the preeminent scholarly journal in the aeronautical aspects of transportation. As an international and interdisciplinary journal, the JAT will provide a forum for peer-reviewed articles in all areas of aviation and space transportation research, policy, theory, case study, practice, and issues. While maintaining a broad scope, a focal point of the journal will be in the area of aviation administration and policy
Derived from text
Air Transportation; Aeronautics; Civil Aviation; Space Transportation

20070022528 Middle Tennessee State Univ., Murfreesboro, TN, USA
The Council on Aviation Accreditation, Part 2, Contemporary Issues
Prather, C. Daniel; Journal of Air Transportation, Volume 11, No. 3; January 2007, pp. 34-60; In English; See also 20070022527; Copyright; Avail.: Other Sources

The Council on Aviation Accreditation (CAA) was established in 1988 in response to the need for formal, specialized accreditation of aviation academic programs, as expressed by institutional members of the University Aviation Association (UAA). The first aviation programs were accredited by the CAA in 1992, and today, the CAA lists 60 accredited programs at 21 institutions nationwide. Although the number of accredited programs has steadily grown, there are currently only 20 percent of UAA member institutions with CAA accredited programs. In an effort to further understand this issue, a case study of the CAA was performed, which resulted in a two-part case study report. Part one addressed the historical foundation of the organization and the current environment in which the CAA functions. Part two focuses on the following questions: (a) what are some of the costs to a program seeking CAA accreditation (b) what are some fo the benefits of being CAA accredited; (c) why do programs seek CAA accreditation; (d) why do programs choose no to seek CAA accreditation; (e) what role is the CAA playing in the international aviation academic community; and (f) what are some possible strategies the CAA may adopt to enhance the benefits of CAA accreditation and increase the number of CAA accredited programs. This second part allows for a more thorough understanding of the contemporary issued faced by the organization, as well as alternative strategies for the CAA to consider in an effort to increase the number of CAA accredited programs and more fully fulfill the role of the CAA in the collegiate aviation community.
Author
Civil Aviation; Air Transportation; Education; Acceptability

20070022529 Embry-Riddle Aeronautical Univ., Daytona Beach, FL, USA
Productivity Analysis of Public and Private Airports: A Causal Investigation
Vasigh, Bijan; Gorjidooz, Javad; Journal of Air Transportation, Volume 11, No. 3; January 2007, pp. 144-163; In English; See also 20070022527; Copyright; Avail.: Other Sources

Around the world, airports are being viewed as enterprises, rather than public services, which are expected to be managed efficiently and provide passengers with courteous customer services. Governments are, increasingly, turning to the private sectors for their efficiency in managing the operation, financing, and development, as well as providing security for airports. Operational and financial performance evaluation has become increasingly important to airport operators due to recent trends in airport privatization. Assessing performance allows the airport operators to plan for human resources and capital investment as efficiently as possible. Productivity measurements may be used as comparisons and guidelines in strategic planning, in the internal analysis of operational efficiency and effectiveness, and in assessing the competitive position of an airport in transportation industry. The primary purpose of this paper is to investigate the operational and financial efficiencies of 22 major airports in the USA and Europe. These airports are divided into three groups based on private ownership (7 British Airport

Authority airports), public ownership (8 major USA airports), and a mix of private and public ownership (7 major European Union airports. The detail ownership structures of these airports are presented in Appendix A. Total factor productivity (TFP) model was utilized to measure airport performance in terms of financial and operational efficiencies and to develop a benchmarking tool to identify the areas of strength and weakness. A regression model was then employed to measure the relationship between TFP and ownership structure. Finally a Granger causality test was performed to determine whether ownership structure is a Granger cause of TFP. The results of the analysis presented in this paper demonstrate that there is not a significant relationship between airport TFP and ownership structure. Airport productivity and efficiency is, however dependent upon the level of competition, choice of the market, and regulatory control.
Author
Airports; Human Resources; Management Planning; Productivity; Air Transportation; General Aviation Aircraft; Mathematical Models

20070022530 Oklahoma State Univ., Tulsa, OK, USA
Human Error: A Concept Analysis
Hansen, Frederick D.; Journal of Air Transportation, Volume 11, No. 3; January 2007, pp. 61-77; In English; See also 20070022527; Copyright; Avail.: Other Sources

Human error is the subject of research in almost every industry and profession of our times. This term is part of our daily language and intuitively understood by most people however, it would be premature to assume that everyone's understanding of human error s the same. For example, human error is used to describe the outcome or consequence of human action, the causal factor of an accident, deliberate violations,a nd the actual action taken by a human being. As a result, researchers rarely agree on the either a specific definition or how to prevent human error. The purpose of this article is to explore the specific concept of human error using Concept Analysis as described by Walker and Avant (1995). The concept of human error is examined as currently used in the literature of a variety of industries and professions. Defining attributes and examples of model, borderline, and contrary cases are described. The antecedents and consequences of human error are also discussed and a definition of human error is offered.
Author
Air Transportation; Human Factors Engineering; Errors; Aircraft Safety; Human Performance

20070022531 Saint Xavier Univ., Chicago, IL, USA
A Correlational Study of How Airline Customer Service and Consumer Perception of Airline Customer Service Affect the Air Rage Phenomenon
Hunter, Joyce A.; Journal of Air Transportation, Volume 11, No. 3; January 2007, pp. 78-109; In English; See also 20070022527; Copyright; Avail.: Other Sources

Between 1995 and 2000, customer service declined throughout the airline industry, as reported in February 2001 by the U.S. Department of Transportation (2001). One of the biggest problems today within the airline industry is the constant complaining from customers regarding the deterioraton of service (McCollough, Berry, & Yadav, 2000). Since 1995, unfortunately no airline has been immune from service deterioration, as reported by the Airline Quality Rating, an annual report by two airline industry experts who analyzed Department of Transportation statistics (Harrison & Kleinsasser, 1999). The airline' refusal to recognize the issue of customer service has perpetuated an environment that has become dangerous and detrimental to the traveling public as well as to airline employees, which in turn has fueled a new phenomenon, now referred to as 'air rage'
Author
Airline Operations; Consumers; Air Transportation; Services; Human Reactions; Correlation

20070022532 Georgia Inst. of Tech., Atlanta, GA, USA
Entity-centric Abstraction and Modeling Framework for Transportation Architectures
Lewe, Jung-Ho; DeLaurentis, Daniel A.; Mavris, Dimitri N.; Schrage, Daniel P.; Journal of Air Transportation, Volume 11, No. 3; January 2007, pp. 3-33; In English; See also 20070022527; Copyright; Avail.: Other Sources

A comprehensive framework for representing transpportation architectures is presented. After discussing a series of preceding perspectives and formulations, the intellectual underpinning of the novel framework using an entity-centric abstraction of transportation is described. The entities include endogenous and exogenous factors and functional expressions are offered that relate these and their evolution. The end result is a Transportation Architecture Field which permits analysis of future concepts under the holistic perspective. A simulation model which stems from the framework is presented and

exercised producing results which quantify improvements in air transportation due to advanced aircraft technologies. Finally, a modeling hypothesis and its accompanying criteria are proposed to test further use of the framework for evaluating new transportation solutions.
Author
Air Transportation; Aerospace Engineering; Aircraft Models; Technology Utilization

20070022533 Purdue Univ., West Lafayette, IN, USA
Emergency Preparedness for Catastrophic Events at Small and Medium Sized Airports: Lacking or Not?
Sweet, Kathleen M.; Journal of Air Transportation, Volume 11, No. 3; January 2007, pp. 110-143; In English; See also 20070022527; Copyright; Avail.: Other Sources

The implementation of security methods and processes in general has had a decisive impact on the aviation industry. However, efforts to effectively coordinate varied aspects of security protocols between agencies and general aviation components have not been adequately addressed. Whether or not overall security issues, especially with regard to planning for catastrophic terrorist events, have been neglected at the nation's smaller airports is the main topic of this paper. For perspective, the term general aviation is generally accepted to include all flying except for military and scheduled airline operations. Genera aviation makes up more than 1 percent of the U.S. Gross Domestic Product and supports almost 1.3 mission high-skilled jobs in professional services and manufacturing and hence is an important component of the aviation industry (AOPA, n.d.). In both conceptual and practical terms, this paper argues for the proactive management of security planning and repeated security awareness training from both an individual and an organizational perspective within the general aviation venue. The results of a research project incorporating survey data from general aviation and small commercial airport managers as well as Transportation Security Administration (TSA) employees are reported. Survey findings suggest that miscommunication does take place on different organizational levels and that between TSA employees and airport management interaction can be contentious and cooperation diminished. The importance of organizational training for decreasing conflict and increasing security and preparedness is discussed as a primary implication.
Author
Aircraft Industry; Airports; Emergencies; Air Transportation; Civil Aviation

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.

20070022260 NASA Langley Research Center, Hampton, VA, USA
Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap
Noll, Thomas E.; Ishmael, Stephen D.; Henwood, Bart; Perez-Davis, Marla E.; Tiffany, Geary C.; Madura, John; Gaier, Matthew; Brown, John M.; Wierzbanowski, Ted; [2007]; 17 pp.; In English; NATO/RTO AVT-145 Workshop on Design Concepts, Processes and Criteria for UAV Structural Integrity, 14-18 May 2007, Florence, Italy; Original contains color illustrations
Contract(s)/Grant(s): WBS 810031.07.12; Copyright; Avail.: CASI: A03, Hardcopy

The Helios Prototype was originally planned to be two separate vehicles, but because of resource limitations only one vehicle was developed to demonstrate two missions. The vehicle consisted of two configurations, one for each mission. One configuration, designated HP01, was designed to operate at extremely high altitudes using batteries and high-efficiency solar cells spread across the upper surface of its 247-foot wingspan. On August 13, 2001, the HP01 configuration reached an altitude of 96,863 feet, a world record for sustained horizontal flight by a winged aircraft. The other configuration, designated HP03, was designed for long-duration flight. The plan was to use the solar cells to power the vehicle's electric motors and subsystems during the day and to use a modified commercial hydrogen-air fuel cell system for use during the night. The aircraft design used wing dihedral, engine power, elevator control surfaces, and a stability augmentation and control system to provide aerodynamic stability and control. At about 30 minutes into the second flight of HP03, the aircraft encountered a disturbance in the way of turbulence and morphed into an unexpected, persistent, high dihedral configuration. As a result of the persistent high dihedral, the aircraft became unstable in a very divergent pitch mode in which the airspeed excursions from the nominal flight speed about doubled every cycle of the oscillation. The aircraft s design airspeed was subsequently exceeded and the resulting high dynamic pressures caused the wing leading edge secondary structure on the outer wing panels to fail and the

solar cells and skin on the upper surface of the wing to rip away. As a result, the vehicle lost its ability to maintain lift, fell into the Pacific Ocean within the confines of the U.S. Navy's Pacific Missile Range Facility, and was destroyed. This paper describes the mishap and its causes, and presents the technical recommendations and lessons learned for improving the design, analysis, and testing methods and techniques required for this class of vehicle.
Author
Aerodynamic Stability; Prototypes; Research Aircraft; Solar Powered Aircraft; Aircraft Accident Investigation; Failure Analysis

20070022364 NASA Glenn Research Center, Cleveland, OH, USA
Fundamental Technology Development for Gas-Turbine Engine Health Management
Mercer, Carolyn R.; Simon, Donald L.; Hunter, Gary W.; Arnold, Steven M.; Reveley, Mary S.; Anderson, Lynn M.; May 07, 2007; 15 pp.; In English; AIAA Infotech \@ Aerospace 2007 Conference, 7-10 May 2007, Rohnert Park, CA, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 645846.02.07.03.02; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022364

Integrated vehicle health management technologies promise to dramatically improve the safety of commercial aircraft by reducing system and component failures as causal and contributing factors in aircraft accidents. To realize this promise, fundamental technology development is needed to produce reliable health management components. These components include diagnostic and prognostic algorithms, physics-based and data-driven lifing and failure models, sensors, and a sensor infrastructure including wireless communications, power scavenging, and electronics. In addition, system assessment methods are needed to effectively prioritize development efforts. Development work is needed throughout the vehicle, but particular challenges are presented by the hot, rotating environment of the propulsion system. This presentation describes current work in the field of health management technologies for propulsion systems for commercial aviation.
Author
Gas Turbine Engines; Technology Utilization; Systems Health Monitoring; Commercial Aircraft

20070022427 Georgia Inst. of Tech., Atlanta, GA, USA, NASA Langley Research Center, Hampton, VA, USA
Implementation of In-Situ Impedance Techniques on a Full Scale Aero-Engine System
Gaeta, R. J.; Mendoza, J. M.; Jones, M. G.; May 21, 2007; 25 pp.; In English; AIAA/CEAS Aeroacoustics Conference, 21-23 May 2007, Rome, Italy; Original contains color and black and white illustrations
Contract(s)/Grant(s): NAS3-00136
Report No.(s): AIAA Paper 2007-3441; Copyright; Avail.: CASI: A03, Hardcopy

Determination of acoustic liner impedance for jet engine applications remains a challenge for the designer. Although suitable models have been developed that take account of source amplitude and the local flow environment experienced by the liner, experimental validation of these models has been difficult. This is primarily due to the inability of researchers to faithfully mimic the environment in jet engine nacelles in the laboratory. An in-situ measurement technique, one that can be implemented in an actual engine, is desirable so an accurate impedance can be determined for future modeling and quality control. This paper documents the implementation of such a local acoustic impedance measurement technique that is used under controlled laboratory conditions as well as on full scale turbine engine liner test article. The objective for these series of in-situ measurements is to substantiate treatment design, provide understanding of flow effects on installed liner performance, and provide modeling input for fan noise propagation computations. A series of acoustic liner evaluation tests are performed that includes normal incidence tube, grazing incidence tube, and finally testing on a full scale engine on a static test stand. Lab tests were intended to provide insight and guidance for accurately measuring the impedance of the liner housed in the inlet of a Honeywell Tech7000 turbofan. Results have shown that one can acquire very reasonable liner impedance data for a full scale engine under realistic test conditions. Furthermore, higher fidelity results can be obtained by using a three-microphone coherence technique that can enhance signal-to-noise ratio at high engine power settings. This research has also confirmed the limitations of this particular type of in-situ measurement. This is most evident in the installation of instrumentation and its effect on what is being measured.
Author
Aircraft Engines; Impedance Measurement; In Situ Measurement; Full Scale Tests; Turbine Engines

20070022496 NASA Dryden Flight Research Center, Edwards, CA, USA

Twist Model Development and Results from the Active Aeroelastic Wing F/A-18 Aircraft

Lizotte, Andrew M.; Allen, Michael J.; June 18, 2007; 16 pp.; In English; International Forum on Aeroelasticity and Structural Dynamics (IFASD), 18-20 Jun. 2007, Stockholm, Sweden; Original contains color illustrations; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022496

Understanding the wing twist of the active aeroelastic wing (AAW) F/A-18 aircraft is a fundamental research objective for the program and offers numerous benefits. In order to clearly understand the wing flexibility characteristics, a model was created to predict real-time wing twist. A reliable twist model allows the prediction of twist for flight simulation, provides insight into aircraft performance uncertainties, and assists with computational fluid dynamic and aeroelastic issues. The left wing of the aircraft was heavily instrumented during the first phase of the active aeroelastic wing program allowing deflection data collection. Traditional data processing steps were taken to reduce flight data, and twist predictions were made using linear regression techniques. The model predictions determined a consistent linear relationship between the measured twist and aircraft parameters, such as surface positions and aircraft state variables. Error in the original model was reduced in some cases by using a dynamic pressure-based assumption. This technique produced excellent predictions for flight between the standard test points and accounted for nonlinearities in the data. This report discusses data processing techniques and twist prediction validation, and provides illustrative and quantitative results.

Author

Aeroelasticity; Computational Fluid Dynamics; F-18 Aircraft; Mathematical Models; Aeroelastic Research Wings

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.

20070022268 NASA Langley Research Center, Hampton, VA, USA

Reuse and Interoperability of Avionics for Space Systems

Hodson, Robert F.; [2007]; 5 pp.; In English; Infotech\@Aerospace 2007 Conference and Exhibit, 7-10 May 2007, Rohnert Park, CA, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 60476.02.06.08.04

Report No.(s): AIAA 207-2918; No Copyright; Avail.: CASI: A01, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022268

The space environment presents unique challenges for avionics. Launch survivability, thermal management, radiation protection, and other factors are important for successful space designs. Many existing avionics designs use custom hardware and software to meet the requirements of space systems. Although some space vendors have moved more towards a standard product line approach to avionics, the space industry still lacks similar standards and common practices for avionics development. This lack of commonality manifests itself in limited reuse and a lack of interoperability. To address NASA s need for interoperable avionics that facilitate reuse, several hardware and software approaches are discussed. Experiences with existing space boards and the application of terrestrial standards is outlined. Enhancements and extensions to these standards are considered. A modular stack-based approach to space avionics is presented. Software and reconfigurable logic cores are considered for extending interoperability and reuse. Finally, some of the issues associated with the design of reusable interoperable avionics are discussed.

Author

Aerospace Systems; Avionics; Interoperability; Software Reuse; Systems Engineering

20070022366 NASA Glenn Research Center, Cleveland, OH, USA

Repair of Electronics for Long Duration Spaceflight

Pettegrew, Richard D.; Easton, John; Struk, Peter; January 08, 2007; 7 pp.; In English; 45th AIAA Aerospace Sciences Conference, 8-11 Jan. 2007, Reno, NV, USA; Original contains color illustrations

Contract(s)/Grant(s): NCC3-975; WBS 706801.04.15.01.02; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022366

To reduce mission risk, long duration spaceflight and exploration activities will require greater degrees of self-sufficiency

with regards to repair capability than have ever been employed before in space exploration. The current repair paradigm of replacing Orbital Replacement Units (ORUs) of malfunctioning avionics and electronic hardware will be impractical, since carrying all of the spares that could possibly be needed for a long duration mission would require upmass and volume at unprecedented and unacceptable levels. A strategy of component-level repair for electronics, however, could significantly reduce the mass and volume necessary for spares and enhance mission safety via a generic contingency capability. This approach is already used to varying degrees by the U.S. Navy, where vessels at sea experience some similar constraints such as the need for self sufficiency for moderately long time periods, and restrictions on volume of repair spares and infrastructure. The concept of conducting component-level repairs of electronics in spacecraft requires the development of design guidelines for future avionics (to enable repair), development of diagnostic techniques to allow an astronaut to pinpoint the faulty component aboard a vastly complex vehicle, and development of tools and methodologies for dealing with the physical processes of replacing the component. This physical process includes tasks such as conformal coating removal and replacement, component removal, replacement, and alignment--all in the difficulty of a reduced gravity environment. Further, the gravitational effects on the soldering process must be characterized and accounted for to ensure reliability of the newly repaired components. The Component-Level Electronics-Assembly Repair (CLEAR) project under the NASA Supportability program was established to develop and demonstrate the practicality of this repair approach. CLEAR involves collaborative efforts between NASA s Glenn Research Center, Langley Research Center, Johnson Space Center, the National Center for Space Exploration Research, and the U.S. Navy. The project goals are 1) develop and demonstrate a manually-operated electronics repair capability to be conducted in a spacecraft environment; and 2) develop guidelines for designs of electronics that facilitates component-level repair for future space exploration efforts. This multi-faceted program utilizes a cross-disciplinary approach to examine pre- and post-repair diagnostics, conformal coating removal and replacement, component soldering, and electronics design for supportability. These areas are investigated by a combination of trade studies, ground based testing, reduced gravity aircraft testing, and actual spaceflight testing on the International Space Station (ISS) in multiple experiments. This paper details the efforts of this program, with emphasis on early trade study results, ground-based efforts, and two upcoming ISS experiments.

Author

Long Duration Space Flight; Maintenance; Avionics; Electronics; International Space Station; Onboard Equipment

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.

20070022339 NASA Dryden Flight Research Center, Edwards, CA, USA

Guidance and Control of an Autonomous Soaring UAV

Allen, Michael J.; Lin, Victor; April 2007; 31 pp.; In English; Original contains color and black and white illustrations

Report No.(s): NASA/TM-2007-214611/REV1; H-2714; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022339

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 motorglider 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

Pilotless Aircraft; Flight Tests; Convection; Control; Convection Currents; Energy Consumption

14
GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

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

20070022624 Institute of Biomedical Problems, Moscow, Russian Federation

Foton-M2 Russian/US Biology Experiments - Development, Implementation, and Operations

Ilyin, Eugene A.; Tairbekov, Murad G.; Vasques, Marilyn F.; Skidmore, Michael G.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-177 - P-180; In English; See also 20070022623; Copyright; Avail.: Other Sources

The Russian Foton-M2 unmanned research satellite launched from Baikonur, Kazakhstan on May 31, 2005. The satellite was recovered 16 days later in northern Kazakhstan near Kustanay. Prior to this mission, the long history of joint NASA/IMBP research using Russian unmanned spacecraft was in danger of withering due to inactivity. This cooperative history included 9 Bion Russian spaceflights in the period from 1975 to 1997 where NASA had participated first as a guest and finally as a contractual partner. In an effort to reinvigorate this long-standing collaboration, the Institute for Biomedical Problems (IMBP) invited NASA participation in Russian experiments that had been manifested to fly on the Foton-M2 mission.
Author

NASA Programs; International Cooperation; Russian Space Program; Bioastronautics; Aerospace Environments; Research Facilities; Research and Development

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*.

20070022277 NASA Johnson Space Center, Houston, TX, USA

TDRSS Augmentation for Launch and Ascent High Speed Navigation Filter

Holt, Greg .; [2007]; 9 pp.; In English; AIAA Guidance, Navigatin, and Control, 20-23 Aug. 2007, Hilton Head, SC, USA; Original contains color illustrations; No Copyright; Avail.: CASI: A02, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022277

An investigation was performed to evaluate the feasibility and possible advantages of augmenting the High Speed Trajectory Determination (HSTD) ground navigation filter with measurements from the Tracking & Data Relay Satellite System (TDRSS) constellation. The proposed communications system strategy for Constellation uses TDRSS rather than ground S-band, so the capability of replacing the S-band navigation capability with TDRSS was considered. HSTD simulations were performed with combinations of S-band, C-band, and TDRSS measurements. Several assumptions are made with regard to measurement biases and signal noise characteristics to produce first-look level accuracies. Preliminary results show that solutions using TDRSS instead of S-band have similar or improved performance from the view of filter covariance and may be a feasible alternative. These results also show that TDRSS tracking alone gives poorer observations and resulting performance Operational and other constraints to the use of TDRSS in a high-speed ground navigation filter are not addressed.
Author

Ascent; High Speed; TDR Satellites; Trajectories; Spacecraft Launching; Navigation Instruments; Kalman Filters

20070022413 NASA Glenn Research Center, Cleveland, OH, USA

JTRS/SCA and Custom/SDR Waveform Comparison

Oldham, Daniel R.; Scardelletti, Maximilian C.; [2007]; 5 pp.; In English; 2007 Military Communications Conference, 29-31 Oct. 2007, Orlando, FL, USA; Original contains black and white illustrations
Contract(s)/Grant(s): WBS 439432.04.07.01; No Copyright; Avail.: CASI: A01, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022413

This paper compares two waveform implementations generating the same RF signal using the same SDR development system. Both waveforms implement a satellite modem using QPSK modulation at 1M BPS data rates with one half rate convolutional encoding. Both waveforms are partitioned the same across the general purpose processor (GPP) and the field programmable gate array (FPGA). Both waveforms implement the same equivalent set of radio functions on the GPP and FPGA. The GPP implements the majority of the radio functions and the FPGA implements the final digital RF modulator

stage. One waveform is implemented directly on the SDR development system and the second waveform is implemented using the JTRS/SCA model. This paper contrasts the amount of resources to implement both waveforms and demonstrates the importance of waveform partitioning across the SDR development system.
Author
Waveforms; Architecture; Software Engineering; Radio Communication; Space Communication

18
SPACECRAFT DESIGN, TESTING AND PERFORMANCE

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

20070022334 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Integration and Testing Challenges of Small Satellite Missions: Experiences from the Space Technology 5 Project
Sauerwein, Timothy A.; Gostomski, Tom; April 23, 2007; 1 pp.; In English; 6th Symposium on Small Satellites for Earth Observation, 23-26 April 2007, Berlin, Germany; No Copyright; Avail.: Other Sources; Abstract Only

The Space Technology 5(ST5) payload was successfully carried into orbit on an OSC Pegasus XL launch vehicle, which was carried aloft and dropped from the OSC Lockheed L-1011 from Vandenberg Air Force Base March 22,2006, at 9:03 am Eastern time, 6:03 am Pacific time. In order to reach the completion of the development and successful launch of ST 5, the systems integration and test(I&T) team determined that a different approach was required to meet the project requirements rather than the standard I&T approach used for single, room-sized satellites. The ST5 payload, part of NASA's New Millennium Program headquartered at JPL, consisted of three micro satellites (approximately 30 kg each) and the Pegasus Support Structure (PSS), the system that connected the spacecrafts to the launch vehicle and deployed the spacecrafts into orbit from the Pegasus XL launch vehicle. ST5 was a technology demonstration payload, intended to test six (6) new technologies for potential use for future space flights along with demonstrating the ability of small satellites to perform quality science. The main technology was a science grade magnetometer designed to take measurements of the earth's magnetic field. The three spacecraft were designed, integrated, and tested at NASA Goddard Space Flight Center with integration and environmental testing occurring in the Bldg. 7-1 0-15-29. The three spacecraft were integrated and tested by the same I&T team. The I&T Manager determined that there was insufficient time in the schedule to perform the three I&T spacecraft activities in series used standard approaches. The solution was for spacecraft #1 to undergo integration and test first, followed by spacecraft #2 and #3 simultaneously. This simultaneous integration was successful for several reasons. Each spacecraft had a Lead Test Conductor who planned and coordinated their spacecraft through its integration and test activities. One team of engineers and technicians executed the integration of all three spacecraft, learning and gaining knowledge and efficiency as spacecraft #1 integration and testing progressed. They became acutely familiar with the hardware, operation and processes for I&T, thus each team member had the experience and knowledge to safely execute I&T for spacecraft #2 and #3 together. The integration team was very versatile and each member could perform many different activities or work any spacecraft, when needed. Daily meetings between the three Lead TCs and technician team allowed the team to plan and implement activities efficiently. The three (3) spacecraft and PSS were successfully integrated and tested, shipped to the launch site, and ready for launch per the I&T schedule that was planned three years previously.
Author
Aerospace Engineering; Payloads; Systems Integration; Acceptability; Performance Tests; Space Technology Experiments

20070022442 NASA Glenn Research Center, Cleveland, OH, USA
Astronaut Risk Levels During Crew Module (CM) Land Landing
Lawrence, Charles; Carney, Kelly S.; Littell, Justin; May 21, 2007; 16 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): WBS 843515.02.01.03.05.08.04
Report No.(s): NASA/TM-2007-214669; E-15803; Copyright; Avail.: CASI: A03, Hardcopy

The NASA Engineering Safety Center (NESC) is investigating the merits of water and land landings for the crew exploration vehicle (CEV). The merits of these two options are being studied in terms of cost and risk to the astronauts, vehicle, support personnel, and general public. The objective of the present work is to determine the astronaut dynamic response index (DRI), which measures injury risks. Risks are determined for a range of vertical and horizontal landing velocities. A structural model of the crew module (CM) is developed and computational simulations are performed using a

transient dynamic simulation analysis code (LS-DYNA) to determine acceleration profiles. Landing acceleration profiles are input in a human factors model that determines astronaut risk levels. Details of the modeling approach, the resulting accelerations, and astronaut risk levels are provided.
Author
Astronauts; Risk; Crew Exploration Vehicle; Spacecraft Design; Vertical Landing; Water Landing

20070022507 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Safe Agents in Space: Lessons from the Autonomous Sciencecraft Experiment
Sherwood, Rob; Chien, Steve; Tran, Daniel; Cichy, Benjamin; Castano, Rebecca; Davies, Ashley; Rabideau, Gregg; December 6, 2004; 13 pp.; In English; Australian Joint Conference on Artificial Intelligence (ACS), 6 Dec. 2004, Cairns, Australia; Original contains black and white illustrations; Copyright; Avail.: Other Sources
ONLINE: http://hdl.handle.net/2014/39949

An Autonomous Science Agent is currently flying onboard the Earth Observing One Spacecraft. This software enables the spacecraft to autonomously detect and respond to science events occurring on the Earth. The package includes software systems that perform science data analysis, deliberative planning, and run-time robust execution. Because of the deployment to a remote spacecraft, this Autonomous Science Agent has stringent constraints of autonomy, reliability, and limited computing resources. We describe these constraints and how they are reflected in our agent architecture.
Author
Autonomy; Software Engineering; Earth Observations (From Space); Aerospace Sciences; Onboard Data Processing

20070022572 Boeing Co., Huntsville, AL, USA
Implementation of Leak Test Methods for the International Space Station (ISS) Elements, Systems and Components
Underwood, Steve; Lvovsky, Oleg; June 12, 2007; 17 pp.; In English; 6th International Symposium on Environmental Testing for Space Programs, 12-14 June 2007, Noordwijk, Netherlands; Original contains color illustrations; Copyright; Avail.:
CASI: A03, Hardcopy

The International Space Station (ISS has Qualification and Acceptance Environmental Test Requirements document, SSP 41172 that includes many environmental tests such as Thermal vacuum & Cycling, Depress/Repress, Sinusoidal, Random, and Acoustic Vibration, Pyro Shock, Acceleration, Humidity, Pressure, Electromatic Interference (EMI)/Electromagnetic Compatibility (EMCO), etc. This document also includes (13) leak test methods for Pressure Integrity Verification of the ISS Elements, Systems, and Components. These leak test methods are well known, however, the test procedure for specific leak test method shall be written and implemented paying attention to the important procedural steps/details that, if omitted or deviated, could impact the quality of the final product and affect the crew safety. Such procedural steps/details for different methods include, but not limited to: - Sequence of testing, for example, pressurization and submersion steps for Method I (Immersion); - Stabilization of the mass spectrometer leak detector outputs for Method II (vacuum Chamber or Bell jar); - Proper data processing and taking a conservative approach while making predictions for on-orbit leakage rate for Method III(Pressure Change); - Proper Calibration of the mass spectrometer leak detector for all the tracer gas (mostly Helium) Methods such as Method V (Detector Probe), Method VI (Hood), Method VII (Tracer Probe), Method VIII(Accumulation); - Usage of visiblility aides for Method I (Immersion), Method IV (Chemical Indicator), Method XII (Foam/Liquid Application), and Method XIII (Hydrostatic/Visual Inspection); While some methods could be used for the total leakage (either internal-to-external or external-to-internal) rate requirement verification (Vacuum Chamber, Pressure Decay, Hood, Accumulation), other methods shall be used only as a pass/fail test for individual joints (e.g., welds, fittings, and plugs) or for troubleshooting purposes (Chemical Indicator, Detector Probe, Tracer Probe, Local Vacuum Chamber, Foam/Liquid Application, and Hydrostatic/Visual Inspection). Any isolation of SSP 41172 requirements have led to either retesting of hardware or accepting a risk associated with the potential system or component pressure integrity problem during flight.
Author
International Space Station; Performance Tests; Leakage; Defects; Acceptability; Requirements

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*.

20070022419 NASA Langley Research Center, Hampton, VA, USA

Development of Eddy Current Techniques for the Detection of Cracking in Space Shuttle Primary Reaction Control Thrusters

Wincheski, Buzz A.; Simpson, John W.; Koshti, Ajay; June 2007; 13 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): WBS 376-70-30-05

Report No.(s): NASA/TP-2007-214878; L-19338; Copyright; Avail.: CASI: A03, Hardcopy

A recent identification of cracking in the Space Shuttle Primary Reaction Control System (PRCS) thrusters triggered an extensive nondestructive evaluation effort to develop techniques capable of identifying such damage on installed shuttle hardware. As a part of this effort, specially designed eddy current probes inserted into the acoustic cavity were explored for the detection of such flaws and for evaluation of the remaining material between the crack tip and acoustic cavity. The technique utilizes two orthogonal eddy current probes which are scanned under stepper motor control in the acoustic cavity to identify cracks hidden with as much as 0.060 remaining wall thickness to the cavity. As crack growth rates in this area have been determined to be very slow, such an inspection provides a large safety margin for continued operation of the critical shuttle hardware. Testing has been performed on thruster components with both actual and fabricated defects. This paper will review the design and performance of the developed eddy current inspection system. Detection of flaws as a function of remaining wall thickness will be presented along with the proposed system configuration for depot level or on-vehicle inspection capabilities.

Author

Eddy Currents; Reaction Control; Detection; Cracking (Fracturing); Thrustors; Space Shuttle Orbiters; Control Systems Design

20070022439 NASA Johnson Space Center, Houston, TX, USA

Lessons Learned JSC Micro-Wireless Instrumentation Systems on Space Shuttle and International Space Station CANEUS 2006

Studor, George; June 18, 2007; 70 pp.; In English; Fly-By-Wireless Workshop, 18-21 June 2007, Paris, France; Original contains color illustrations; No Copyright; Avail.: CASI: A04, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022439

A viewgraph presentation on lessons learned from NASA Johnson Space Center's micro-wireless instrumentation is shown. The topics include: 1) Background, Rationale and Vision; 2) NASA JSC/Structural Engineering Approach & History; 3) Orbiter Wing Leading Edge Impact Detection System; 4) WLEIDS Confidence and Micro-WIS Lessons Learned; and 5) Current Projects and Recommendations.

CASI

International Space Station; Wireless Communication; Microinstrumentation; Space Shuttle Orbiters; Structural Engineering

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*.

20070022221 NASA Glenn Research Center, Cleveland, OH, USA

An Overview and Status of NASA's Radioisotope Power Conversion Technology NRA

Anderson, David J.; Wong, Wayne A.; Tuttle, Karen L.; 2005; 9 pp.; In English; 3rd International Energy Conversion Engineering Conference, 15-18 Aug. 2005, San Francisco, CA, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 22-972-90-01

Report No.(s): AIAA Paper 2005-5713; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022221

NASA's Advanced Radioisotope Power Systems (RPS) development program is developing next generation radioisotope

power conversion technologies that will enable future missions that have requirements that can not be met by either photovoltaic systems or by current Radioisotope Power System (RPS) technology. The Advanced Power Conversion Research and Technology project of the Advanced RPS development program is funding research and technology activities through the NASA Research Announcement (NRA) 02- OSS-01, 'Research Opportunities in Space Science 2002' entitled 'Radioisotope Power Conversion Technology' (RPCT), 13 August 2002. The objective of the RPCT NRA is to advance the development of radioisotope power conversion technologies to provide significant improvements over the state-of-practice General Purpose Heat Source/Radioisotope Thermoelectric Generator by providing significantly higher efficiency to reduce the number of radioisotope fuel modules, and increase specific power (watts/kilogram). Other Advanced RPS goals include safety, long-life, reliability, scalability, multi-mission capability, resistance to radiation, and minimal interference with the scientific payload. These advances would enable a factor of 2 to 4 decrease in the amount of fuel required to generate electrical power. The RPCT NRA selected advanced RPS power conversion technology research and development proposals in the following three areas: innovative RPS power conversion research, RPS power conversion technology development in a nominal 100We scale; and, milliwatt/multi-watt RPS (mWRPS) power conversion research. Ten RPCT NRA contracts were awarded in 2003 in the areas of Brayton, Stirling, thermoelectric (TE), and thermophotovoltaic (TPV) power conversion technologies. This paper will provide an overview of the RPCT NRA, and a brief summary of accomplishments over the first 18 months but focusing on advancements made over the last 6 months.

Author

Radioisotope Heat Sources; Thermoelectric Generators; Thermophotovoltaic Conversion; Spacecraft Power Supplies

20070022272 NASA Marshall Space Flight Center, Huntsville, AL, USA

Liquid-Metal Pump Technologies for Nuclear Surface Power

Polzin, K. A.; March 2007; 40 pp.; In English; Original contains color and black and white illustrations

Report No.(s): NASA/TM-2007-214851; M-1182; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022272

Multiple liquid-metal pump options are reviewed for the purpose of determining the technologies that are best suited for inclusion in a nuclear reactor thermal simulator intended to test prototypical space nuclear system components. Conduction, induction, and thermoelectric electromagnetic pumps are evaluated based on their performance characteristics and the technical issues associated with incorporation into a reactor system. The thermoelectric pump is recommended for inclusion in the planned system at NASA MSFC based on its relative simplicity, low power supply mass penalty, flight heritage, and the promise of increased pump efficiency over earlier flight pump designs through the use of skutterudite thermoelectric elements.

Author

Electromagnetic Pumps; Liquid Metals; Space Power Reactors; Magnetohydrodynamics

20070022363 NASA Glenn Research Center, Cleveland, OH, USA

Polymeric Materials for Aerospace Power and Propulsion: Overview of Polymer Research at NASA Glenn

Meador, Michael A.; February 12, 2007; 48 pp.; In English; High Temple Workshop 27/DoD-NASA, 12-15 Feb. 2007, Sedona, AZ, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 561581.02.08.03.15.03; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022363

Weight, durability and performance are all major concerns for any NASA mission. Use of lightweight materials, such as fiber reinforced polymer matrix composites can lead to significant reductions in vehicle weight and improvements in vehicle performance. Research in the Polymeric Materials Branch at NASA Glenn is focused on improving the durability, properties, processability and performance of polymeric materials by utilizing both conventional polymer science and engineering as well as nanotechnology and bioinspired approaches. This presentation will provide an overview of these efforts and highlight recent progress.

Author

Polymer Matrix Composites; General Overviews; Aerospace Vehicles; Research; Nanotechnology; Spacecraft Propulsion

24
COMPOSITE MATERIALS

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

20070022248 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Coated Fused Silica Fibers for Enhanced Sensitivity Torsion Pendulum
Numata, Kenji; Horowitz, Jordan; Camp, Jordan; [2007]; 20 pp.; In English; Original contains black and white illustrations
Contract(s)/Grant(s): NNG06E090A; Copyright; Avail.: CASI: A03, Hardcopy

In order to investigate the fundamental thermal noise limit of a torsion pendulum using a fused silica fiber, we systematically measured and modeled the mechanical losses of thin fused silica fibers coated by electrically conductive thin metal films. Our results indicate that it is possible to achieve a thermal noise limit for coated silica lower by a factor between 3 and 9, depending on the silica diameter, compared to the best tungsten fibers available. This will allow a corresponding increase in sensitivity of torsion pendula used for weak force measurements, including the gravitational constant measurement and ground-based force noise testing for the Laser Interferometer Space Antenna (LISA) mission.
Author
Coatings; LISA (Observatory); Pendulums; Silica Glass; Silicon Dioxide; Thin Films; Torsion

20070022360 NASA Glenn Research Center, Cleveland, OH, USA
Weathering of Thermal Control Coatings
Jaworske, Donald A.; Tuan, George C.; Westheimer, David T.; Peters, Wanda C.; Kauder, Lonny R.; Triolo, Jack J.; July 09, 2007; 7 pp.; In English; 37th International Conference on Environmental Systems, 9-12 Jul. 2007, Chicago, IL, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 644423.06.32.03.12.03
Report No.(s): 07ICES-40; Copyright; Avail.: Other Sources

Spacecraft radiators reject heat to their surroundings. Radiators can be deployable or mounted on the body of the spacecraft. NASA's Crew Exploration Vehicle is to use body mounted radiators. Coatings play an important role in heat rejection. The coatings provide the radiator surface with the desired optical properties of low solar absorptance and high infrared emittance. These specialized surfaces are applied to the radiator panel in a number of ways, including conventional spraying, plasma spraying, or as an applique. Not specifically designed for a weathering environment, little is known about the durability of conventional paints, coatings, and appliques upon exposure to weathering and subsequent exposure to solar wind and ultraviolet radiation exposure. In addition to maintaining their desired optical properties, the coatings must also continue to adhere to the underlying radiator panel. This is a challenge, as new composite radiator panels are being considered as replacements for the aluminum panels used previously. Various thermal control paints, coatings, and appliques were applied to aluminum and isocyanate ester composite coupons and were exposed for 30 days at the Atmospheric Exposure Site of the Kennedy Space Center s Beach Corrosion Facility for the purpose of identifying their durability to weathering. Selected coupons were subsequently exposed to simulated solar wind and vacuum ultraviolet radiation to identify the effect of a simulated space environment on the as-weathered surfaces. Optical properties and adhesion testing were used to document the durability of the paints and coatings. The purpose of this paper is to present the results of the weathering testing and to summarize the durability of several thermal control paints, coatings, and appliques to weathering and postweathering environments.
Author
Spacecraft Radiators; Thermal Control Coatings; Weathering; Composite Materials; Optical Properties; Crew Exploration Vehicle

20070022361 NASA Glenn Research Center, Cleveland, OH, USA
Graphite/Polyimide Composites Subjected to Biaxial Loads at Elevated Temperatures
Kumosa, Maciej S.; Sutter, J. K.; February 12, 2007; 41 pp.; In English; High Temple Workshop 27/DoD-NASA, 12-15 Feb. 2007, Sedona, AZ, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 138494.04.01.01; Copyright; Avail.: CASI: A03, Hardcopy

First, we will review our most important research accomplishments from a five year study concerned with the prediction of mechanical properties of unidirectional and woven graphite/polyimide composites based on T650-35, M40J and M60J fibers embedded in either PMR-15 or PMR-II-50 polyimide resins. Then, an aging model recently developed for the composites aged in nitrogen will be proposed and experimentally verified on an eight harness satin (8HS) woven

T650-35/PMR-15 composite aged in nitrogen at 315 C for up to 1500 hours. The study was supported jointly between 1999 and 2005 by the AFOSR, the NASA Glenn Research Center, and the National Science Foundation.
Author
High Temperature; Polyimide Resins; Mechanical Properties; Mathematical Models; Graphite-Polyimide Composites; Axial Loads

20070022367 NASA Glenn Research Center, Cleveland, OH, USA
Sulfur and Moisture Effects on Alumina Scale and TBC Spallation
Smialek, James L.; May 09, 2007; 78 pp.; In English; GE Aviation, 9 May 2007, Evendale, OH, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 561581.02.10.03.03; No Copyright; Avail.: CASI: A05, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022367

It has been well established that a few ppmw sulfur impurity may segregate to the interface of thermally grown alumina scales and the underlying substrate, resulting in bond degradation and premature spallation. This has been shown for NiAl and NiCrAl-based alloys, bare single crystal superalloys, or coated superalloys. The role of reactive elements (especially Y) has been to getter the sulfur in the bulk and preclude interfacial segregation. Pt additions are also very beneficial, however a similar thermodynamic explanation does not apply. The purpose of the present discussion is to highlight some observations of these effects on Rene'142, Rene'N5, PWA1480, and PWA1484. For PWA1480, we have mapped cyclic oxidation and spallation in terms of potential sulfur interfacial layers and found that a cumulative amount of about one monolayer is sufficient to degrade long term adhesion. Depending on substrate thickness, optimum performance occurs if sulfur is reduced below about 0.2-0.5 ppmw. This is accomplished in the laboratory by hydrogen annealing or commercially by melt-fluxing. Excellent 1150 C cyclic oxidation is thus demonstrated for desulfurized Rene'142, Rene'N5, and PWA1484. Alternatively, a series of N5 alloys provided by GE-AE have shown that as little as 15 ppmw of Y dopant was effective in providing remarkable scale adhesion. In support of a Y-S gettering mechanism, hydrogen annealing was unable to desulfurize these alloys from their initial level of 5 ppmw S. This impurity and critical doping level corresponds closely to YS or Y2S3 stoichiometry. In many cases, Y-doped alloys or alloys with marginal sulfur levels exhibit an oxidative sensitivity to the ambient humidity called Moisture-Induced Delayed Spallation (MIDS). After substantial scale growth, coupled with damage from repeated cycling, cold samples may spall after a period of time, breathing on them, or immersing them in water. While stress corrosion arguments may apply, we propose that the underlying cause is related to a hydrogen embrittlement reaction: Al alloy + 3 H2O = Al(OH)3 + 3H(+) + 3e(-). This mechanism is derived from an analogous moisture-induced hydrogen embrittlement mechanism originally shown for Ni3Al and FeAl intermetallics. Consequently, a cathodic hydrogen charging technique was used to demonstrate that electrolytic de-scaling occurs for these otherwise adherent alumina scales formed on Y-doped Rene'N5, in support of hydrogen effects. Finally, some TBC observations are discussed in light of all of the above. Plasma sprayed 8YSZ coatings, produced on PWA1484 without a bond coat, were found to survive more than 1000 1-hr cycles at 1100 C when desulfurized to below 0.1 ppmw. At higher sulfur (1.2 ppmw) levels, moisture sensitivity and delayed TBC failure, referred to as Desk Top Spallation, occurred at just 200 hr. Despite a large degree of scatter, a factor of 5 in life improvement is indicated for desulfurized samples in cyclic furnace tests, confirming the beneficial effect of low sulfur alloys on model TBC systems. (DTS and moisture effects are also observed on commercially applied PVD 7YSZ coatings on Rene'N5+Y with Pt-aluminide bond coats). These types of catastrophic failure were subverted on the model system by segmenting the substrate into a network of 0.010 high ribs, spaced in. apart, prior to plasma spraying. No failures occurred after 1000 cycles at 1150 C or after 2000 cycles at 1100 C, even after water immersion. The benefit is described in terms of elasticity models and a critical buckling stress.
Author
Spallation; Sulfur; Moisture; Aluminum Alloys; Heat Resistant Alloys

20070022368 NASA Glenn Research Center, Cleveland, OH, USA
Effect of an Opaque Reflecting Layer on the Thermal Behavior of a Thermal Barrier Coating
Spuckler, Charles M.; January 21, 2007; 12 pp.; In English; 31st International Cocoa Beach Conference and Expositon on Advanced Ceramics and Composites, 21-26 Jan. 2007, Daytona Beach, FL, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 599489.02.07.03.02.02.02; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022368

A parametric study using a two-flux approximation of the radiative transfer equation was performed to examine the effects of an opaque reflective layer on the thermal behavior of a typical semitransparent thermal barrier coating on an opaque substrate. Some ceramic materials are semitransparent in the wavelength ranges where thermal radiation is important. Even

with an opaque layer on each side of the semitransparent thermal barrier coating, scattering and absorption can have an effect on the heat transfer. In this work, a thermal barrier coating that is semitransparent up to a wavelength of 5 micrometers is considered. Above 5 micrometers wavelength, the thermal barrier coating is opaque. The absorption and scattering coefficient of the thermal barrier was varied. The thermal behavior of the thermal barrier coating with an opaque reflective layer is compared to a thermal barrier coating without the reflective layer. For a thicker thermal barrier coating with lower convective loading, which would be typical of a combustor liner, a reflective layer can significantly decrease the temperature in the thermal barrier coating and substrate if the scattering is weak or moderate and for strong scattering if the absorption is large. The layer without the reflective coating can be about as effective as the layer with the reflective coating if the absorption is small and the scattering strong. For low absorption, some temperatures in the thermal barrier coating system can be slightly higher with the reflective layer. For a thin thermal barrier coating with high convective loading, which would be typical of a blade or vane that sees the hot sections of the combustor, the reflective layer is not as effective. The reflective layer reduces the surface temperature of the reflective layer for all conditions considered. For weak and moderate scattering, the temperature of the TBC-substrate interface is reduced but for strong scattering, the temperature of the substrate is increased slightly.
Author

Reflection; Temperature Effects; Thermal Control Coatings; Parameterization; Layers

20070022369 NASA Glenn Research Center, Cleveland, OH, USA

Composite Overwrap Pressure Vessels: Mechanics and Stress Rupture Lifing Philosophy

Thesken, John C.; Murthy, Pappu L. N.; Phoenix, Leigh; April 23, 2007; 21 pp.; In English; 48th AIAA/ASME/ASCE/ASC Structures, Structural Dynamics and Materials Conference, 23-26 Apr. 2007, Honolulu, HI, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 510505.03.03.02.01; Copyright; Avail.: CASI: A03, Hardcopy

The NASA Engineering and Safety Center (NESC) has been conducting an independent technical assessment to address safety concerns related to the known stress rupture failure mode of filament wound pressure vessels in use on Shuttle and the International Space Station. The Shuttle's Kevlar-49 fiber overwrapped tanks are of particular concern due to their long usage and the poorly understood stress rupture process in Kevlar-49 filaments. Existing long term data show that the rupture process is a function of stress, temperature and time. However due to the presence of load sharing liners and the complex manufacturing procedures, the state of actual fiber stress in flight hardware and test articles is not clearly known. Indeed non-conservative life predictions have been made where stress rupture data and lifing procedures have ignored the contribution of the liner in favor of applied pressure as the controlling load parameter. With the aid of analytical and finite element results, this paper examines the fundamental mechanical response of composite overwrapped pressure vessels including the influence of elastic-plastic liners and degraded/creeping overwrap properties. Graphical methods are presented describing the non-linear relationship of applied pressure to Kevlar-49 fiber stress/strain during manufacturing, operations and burst loadings. These are applied to experimental measurements made on a variety of vessel systems to demonstrate the correct calibration of fiber stress as a function of pressure. Applying this analysis to the actual qualification burst data for Shuttle flight hardware revealed that the nominal fiber stress at burst was in some cases 23% lower than what had previously been used to predict stress rupture life. These results motivate a detailed discussion of the appropriate stress rupture lifing philosophy for COPVs including the correct transference of stress rupture life data between dissimilar vessels and test articles.
Author

Composite Wrapping; Failure Modes; Pressure Vessels; Creep Rupture Strength; Mechanical Properties; Mathematical Models

20070022453 NASA Glenn Research Center, Cleveland, OH, USA

Improved Thermal Design of a Compression Mold

Kuczmarski, Maria A.; Johnston, J. Christopher; [2007]; 30 pp.; In English; Original contains black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022453

An analysis of the heat transfer in a tool for producing neat resin disks was conducted to determine how to bring about a better agreement between the tool temperature and the applied temperature profile. Using the commercial code FLUENT to investigate the relative effects of heat conduction into the tool and heat loss from the tool by convection, it was shown that convective heat transfer appears more important than conduction in controlling the tool performance. Decreasing the height of the tool was predicted to decrease the heat losses by convection. Redesign of the tool based on this analysis resulted in the tool experiencing the applied temperature profile.
Author

Polymers; Molds; Compressing; Convective Heat Transfer; Mathematical Models; Thermal Analysis

20070022458 NASA Langley Research Center, Hampton, VA, USA, Utah Univ., Salt Lake City, UT, USA
Multi-Functional Sandwich Composites for Spacecraft Applications: An Initial Assessment
Adams, Daniel O.; Webb, Nicholas Jason; Yarger, Cody B.; Hunter, Abigail; Oborn, Kelli D.; June 2007; 184 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): NAG1-03085; WBS 732759.07.09
Report No.(s): NASA/CR-2007-214880; No Copyright; Avail.: CASI: A09, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022458

Current spacecraft implement relatively uncoupled material and structural systems to address a variety of design requirements, including structural integrity, damage tolerance, radiation protection, debris shielding and thermal insulation. This investigation provided an initial assessment of multi-functional sandwich composites to integrate these diverse requirements. The need for radiation shielding was addressed through the selection of polymeric constituents with high hydrogen content. To provide increased damage tolerance and debris shielding, manufacturing techniques were developed to incorporate transverse stitching reinforcement, internal layers, and a self-healing ionomer membrane. To assess the effects of a space environment, thermal expansion behavior of the candidate foam materials was investigated under a vacuum and increasing temperature. Finally, a thermal expansion model was developed for foam under vacuum conditions and its predictive capability assessed.
Author
Sandwich Structures; Composite Materials; Spacecraft Design; Radiation Shielding; Technology Assessment; Extraterrestrial Radiation

20070022474 NASA White Sands Test Facility, NM, USA, Missouri Univ., Columbia, MO, USA
Characterization of Kevlar Using Raman Spectroscopy
Washer, Glenn; Brooks, Thomas; Saulsberry, Regor; [2007]; 31 pp.; In English
Contract(s)/Grant(s): NAS1-00135; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022474

This paper explores the characterization of Kevlar composite materials using Raman spectroscopy. The goal of the research is to develop and understand the Raman spectrum of Kevlar materials to provide a foundation for the development of nondestructive evaluation (NDE) technologies based on the interaction of laser light with the polymer Kevlar. The paper discusses the fundamental aspects of experimental characterization of the spectrum of Kevlar, including the effects of incident wavelength, polarization and laser power. The effects of environmental exposure of Kevlar materials on certain characteristics of its Raman spectrum are explored, as well as the effects of applied stress. This data may provide a foundation for the development of NDE technologies intended to detect the in-situ deterioration of Kevlar materials used for engineering applications that can later be extended to other materials such as carbon fiber composites.
Author
Kevlar (Trademark); Raman Spectroscopy; Characterization; Composite Materials; Polymers; Fiber Composites

25
INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY

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

20070022436 NASA Johnson Space Center, Houston, TX, USA
Test 6, Test 7, and Gas Standard Analysis Results
Perez, Horacio, III; June 04, 2007; 16 pp.; In English; NASA/JAXA Technical Interchange Meeting, 4-7 June, 2007, Tsukuba, Japan; Original contains color illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022436

This viewgraph presentation shows results of analyses on odor, toxic off gassing and gas standards. The topics include: 1) Statistical Analysis Definitions; 2) Odor Analysis Results NASA Standard 6001 Test 6; 3) Toxic Off gassing Analysis Results NASA Standard 6001 Test 7; and 4) Gas Standard Results NASA Standard 6001 Test 7;
CASI
Gas Analysis; Standards; Odors; Toxicity

26
METALS AND METALLIC MATERIALS

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

20070022412 NASA Glenn Research Center, Cleveland, OH, USA

An Update on the Lithium-Ion Cell Low-Earth-Orbit Verification Test Program

Reid, Concha M.; Manzo, Michelle A.; Miller, Thomas B.; McKissock, Barbara I.; Bennett, William; November 11, 2007; 23 pp.; In English; NASA Aerospace Battery Workshop, 14-16 Nov. 2006, Huntsville, AL, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 038957.04.01.02.03; Copyright; Avail.: CASI: A03, Hardcopy

A Lithium-Ion Cell Low-Earth-Orbit Verification Test Program is being conducted by NASA Glenn Research Center to assess the performance of lithium-ion (Li-ion) cells over a wide range of low-Earth-orbit (LEO) conditions. The data generated will be used to build an empirical model for Li-ion batteries. The goal of the modeling will be to develop a tool to predict the performance and cycle life of Li-ion batteries operating at a specified set of mission conditions. Using this tool, mission planners will be able to design operation points of the battery system while factoring in mission requirements and the expected life and performance of the batteries. Test conditions for the program were selected via a statistical design of experiments to span a range of feasible operational conditions for LEO aerospace applications. The variables under evaluation are temperature, depth-of-discharge (DOD), and end-of-charge voltage (EOCV). The baseline matrix was formed by generating combinations from a set of three values for each variable. Temperature values are 10 C, 20 C and 30 C. Depth-of-discharge values are 20%, 30% and 40%. EOCV values are 3.85 V, 3.95 V, and 4.05 V. Test conditions for individual cells may vary slightly from the baseline test matrix depending upon the cell manufacturer s recommended operating conditions. Cells from each vendor are being evaluated at each of ten sets of test conditions. Cells from four cell manufacturers are undergoing life cycle tests. Life cycling on the first sets of cells began in September 2004. These cells consist of Saft 40 ampere-hour (Ah) cells and Lith ion 30 Ah cells. These cells have achieved over 10,000 cycles each, equivalent to about 20 months in LEO. In the past year, the test program has expanded to include the evaluation of Mine Safety Appliances (MSA) 50 Ah cells and ABSL battery modules. The MSA cells will begin life cycling in October 2006. The ABSL battery modules consist of commercial Sony hard carbon 18650 lithium-ion cells configured in series and parallel combinations to create nominal 14.4 volt, 3 Ah packs (4s-2p). These modules have accumulated approximately 3000 cycles. Results on the performance of the cells and modules will be presented in this paper. The life prediction and performance model for Li-ion cells in LEO will be built by analyzing the data statistically and performing regression analysis. Cells are being cycled to failure so that differences in performance trends that occur at different stages in the life of the cell can be observed and accurately modeled. Cell testing is being performed at the Naval Surface Warfare Center in Crane, IN.

Author

Lithium; Metal Ions; Low Earth Orbits; Lithium Batteries; Aerospace Engineering

20070022443 NASA Glenn Research Center, Cleveland, OH, USA

Development of Oxidation Resistant Coatings on GRCop-84 Substrates by Cold Spray Process

Karthikeyan, J.; May 02, 2007; 16 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): NNC05QA42P

Report No.(s): NASA/CR-2007-214706; E-15931; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022443

GRCop-84, a Cu-CR-Nb alloy, has been developed for rocket engine liner applications. For maximum life additional oxidation protection is required to prevent blanching. NiCrAlY was identified as a suitable coating, and efforts were initiated to develop suitable coating techniques. Cold spray is one technique under consideration. Efforts at ASB Industries to produce dense, adherent coatings are detailed. The work culminated in the production of samples for testing at NASA Glenn Research Center.

Author

Coating; Copper Alloys; Chromium Alloys; Niobium Alloys; Sprayers; Oxidation Resistance; Cooling; Aluminum Alloys; Yttrium Alloys; Oxidation; Substrates

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*.

20070022450 NASA Langley Research Center, Hampton, VA, USA, Texas A&M Univ., College Station, TX, USA
Characterization of Nonlinear Rate Dependent Response of Shape Memory Polymers
Volk, Brent; Lagoudas, Dimitris C.; Chen, Yi-Chao; Whitley, Karen S.; May 16, 2007; 13 pp.; In English; Original contains color illustrations; Copyright; Avail.: CASI: A03, Hardcopy

Shape Memory Polymers (SMPs) are a class of polymers, which can undergo deformation in a flexible state at elevated temperatures, and when cooled below the glass transition temperature, while retaining their deformed shape, will enter and remain in a rigid state. Upon heating above the glass transition temperature, the shape memory polymer will return to its original, unaltered shape. SMPs have been reported to recover strains of over 400%. It is important to understand the stress and strain recovery behavior of SMPs to better develop constitutive models which predict material behavior. Initial modeling efforts did not account for large deformations beyond 25% strain. However, a model under current development is capable of describing large deformations of the material. This model considers the coexisting active (rubber) and frozen (glass) phases of the polymer, as well as the transitions between the material phases. The constitutive equations at the continuum level are established with internal state variables to describe the microstructural changes associated with the phase transitions. For small deformations, the model reduces to a linear model that agrees with those reported in the literature. Thermomechanical characterization is necessary for the development, calibration, and validation of a constitutive model. The experimental data reported in this paper will assist in model development by providing a better understanding of the stress and strain recovery behavior of the material. This paper presents the testing techniques used to characterize the thermomechanical material properties of a shape memory polymer (SMP) and also presents the resulting data. An innovative visual-photographic apparatus, known as a Vision Image Correlation (VIC) system was used to measure the strain. The details of this technique will also be presented in this paper. A series of tensile tests were performed on specimens such that strain levels of 10, 25, 50, and 100% were applied to the material while it was above its glass transition temperature. After deforming the material to a specified applied strain, the material was then cooled to below the glass transition temperature (Tg) while retaining the deformed shape. Finally, the specimen was heated again to above the transition temperature, and the resulting shape recovery profile was measured. Results show that strain recovery occurs at a nonlinear rate with respect to time. Results also indicate that the ratio of recoverable strain/applied strain increases as the applied strain increases.
Author
Characterization; Nonlinearity; Polymers; Mathematical Models; Thermodynamics; Microstructure; Shapes

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*.

20070022362 NASA Glenn Research Center, Cleveland, OH, USA
High Pressure Low NOx Emissions Research: Recent Progress at NASA Glenn Research Center
Chi-Ming, Lee; Tacina, Kathleen M.; Wey, Changlie; [2007]; 8 pp.; In English; ISABE 2007, 2-7 Sept. 2007, Beijing, China; Original contains color illustrations
Contract(s)/Grant(s): WBS 561581.02.08.03.16.02
Report No.(s): ISABE-2007-1270; Copyright; Avail.: CASI: A02, Hardcopy

In collaboration with U.S. aircraft engine companies, NASA Glenn Research Center has contributed to the advancement of low emissions combustion systems. For the High Speed Research Program (HSR), a 90% reduction in nitrogen oxides (NOx) emissions (relative to the then-current state of the art) has been demonstrated in sector rig testing at General Electric Aircraft Engines (GEAE). For the Advanced Subsonic Technology Program (AST), a 50% reduction in NOx emissions relative to the 1996 International Civil Aviation Organization (ICAO) standards has been at demonstrated in sector rigs at both GEAE and Pratt & Whitney (P&W). During the Ultra Efficient Engine Technology Program (UEET), a 70% reduction in NOx emissions, relative to the 1996 ICAO standards, was achieved in sector rig testing at Glenn in the world class Advanced Subsonic Combustion Rig (ASCR) and at contractor facilities. Low NOx combustor development continues under the

Fundamental Aeronautics Program. To achieve these reductions, experimental and analytical research has been conducted to advance the understanding of emissions formation in combustion processes. Lean direct injection (LDI) concept development uses advanced laser-based non-intrusive diagnostics and analytical work to complement the emissions measurements and to provide guidance for concept improvement. This paper describes emissions results from flametube tests of a 9- injection-point LDI fuel/air mixer tested at inlet pressures up to 5500 kPa. Sample results from CFD and laser diagnostics are also discussed. Author

Civil Aviation; High Pressure; Nitrogen Oxides; Exhaust Emission; Aircraft Engines; Computational Fluid Dynamics; Contaminants; Research

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*.

20070022267 NASA Langley Research Center, Hampton, VA, USA

Structural Test and Analysis of a Hybrid Inflatable Antenna

Gaspar, James L.; Mann, Troy; Sreekantamurthy, Tham; Behun, Vaughn; [2007]; 17 pp.; In English; 48th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, 23-26 Apr. 2007, Waikiki, HI, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 439432.07.02.07

Report No.(s): AIAA Paper 2007-1832; Copyright; Avail.: CASI: A03, Hardcopy

NASA is developing ultra-lightweight structures technology for communication antennas for space missions. One of the research goals is to evaluate the structural characteristics of inflatable and rigidizable antennas through test and analysis. Being able to test and analyze the structural characteristics of a full scale antenna is important to enable the simulation of various mission scenarios to determine system performance in space. Recent work completed to evaluate a Hybrid Inflatable Antenna concept will be discussed. Tests were completed on a 2-m prototype to optimize its static shape and identify its modal dynamics that are important for analytical model validation. These test results were used to evaluate a preliminary finite element model of the antenna, and this model development and correlation activity is also described in the paper. Author

Antenna Design; Mathematical Models; Structural Engineering; Inflatable Structures; Structural Analysis

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*.

20070022223 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Single Event Transients in Voltage Regulators for FPGA Power Supply Applications

Poivey, Christian; Sanders, Anthony; Kim, Hak; Phan, Anthony; Forney, Jim; LaBel, Kenneth A.; Karsh, Jeremy; Pursley, Scott; Kleyner, Igor; Katz, Richard; September 27, 2006; 10 pp.; In English; Radiation and Its Effects on Components and Systems (RADECS) 2006, 27-29 Sep. 2006, Athens, Greece; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy

As with other bipolar analog devices, voltage regulators are known to be sensitive to single event transients (SET). In typical applications, large output capacitors are used to provide noise immunity. Therefore, since SET amplitude and duration are generally small, they are often of secondary importance due to this capacitance filtering. In low voltage applications, however, even small SET are a concern. Over-voltages may cause destructive conditions. Under-voltages may cause functional interrupts and may also trigger electrical latchup conditions. In addition, internal protection circuits which are affected by load as well as internal thermal effects can also be triggered from heavy ions, causing dropouts or shutdown ranging from milliseconds to seconds. In the case of FPGA power supplies applications, SETS are critical. For example, in the case of Actel FPGA RTAX family, core power supply voltage is 1.5V. Manufacturer specifies an absolute maximum rating of 1.6V and recommended operating conditions between 1.425V and 1.575V. Therefore, according to the manufacturer, any transient of

amplitude greater than 75 mV can disrupt normal circuit functions, and overvoltages greater than 100 mV may damage the FPGA. We tested five low dropout voltage regulators for SET sensitivity under a large range of circuit application conditions. Author

Circuits; Electric Potential; Field-Programmable Gate Arrays; Voltage Regulators; Surges

20070022224 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter

Meyer, Stephen; Buchner, Stephen; Moseley, Harvey; Ray, Knute; Tuttle, Jim; Quinn, Ed; Buchanan, Ernie; Bloom, Dave; Hait, Tom; Pearce, Mike; Rapchun, David A.; [2006]; 13 pp.; In English; Radiation and Its Effects on Components and Systems (RADECS) 2006, 27-29 Sep. 2006, Athens, Greece; Original contains color illustrations; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022224

This viewgraph presentation reviews the low temperature, Total Ionizing Dose (TID) tests of radiation hardened serial to parallel converter to be used on the James Webb Space Telescope. The test results show that the original HV583 level shifter - a COTS part -was not suitable for JWST because the supply currents exceeded specs after 20 krad(Si) .The HV584 - functionally similar to the HV583 -was designed using RHBD approach that reduced the leakage currents to within acceptable levels and had only a small effect on the level-shifted output voltage.

CASI

Low Temperature; Traveling Ionospheric Disturbances; Converters; Radiation Hardening; Electronic Equipment

20070022329 NASA Goddard Space Flight Center, Greenbelt, MD, USA

A Technical and Cost Perspective on Radiation Testing Challenges

LaBel, Kenneth A.; Cohen, Lewis M.; December 06, 2006; 11 pp.; In English; Microelectronics Reliability and Qualification Workshop, 6-7 December 2006, Los Angeles, CA, USA; Original contains color illustrations; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022329

A viewgraph presentation detailing costs and technical perspectives on radiation testing is shown. The topics include: 1) Introduction - a Changing Microelectronics World; 2) Sample Technology Changes and Related Impacts on Radiation Testing; 3) Perspective on the 'New' Cost or Doing Business; and 4) Considerations.

CASI

Costs; Microelectronics; Technology Utilization; Radiation Effects

20070022358 NASA Glenn Research Center, Cleveland, OH, USA

Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor

Bowman, Cheryl L.; Geng, Steven M.; Niedra, Janis M.; Sayir, Ali; Shin, Eugene E.; Sutter, James K.; Thieme, Lanny G.; June 24, 2007; 6 pp.; In English; Proceedings of Space Nuclear Conference 2007, 24-28 Jun. 2007, Boston, MA, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 850661.04.01.03

Report No.(s): Paper 2035; Copyright; Avail.: CASI: A02, Hardcopy

A fission reactor combined with a free-piston Stirling convertor is one of many credible approaches for producing electrical power in space applications. This study assumes dual-opposed free-piston Stirling engines/linear alternators that will operate nominally at 825 K hot-end and 425 K cold-end temperatures. The baseline design options, temperature profiles, and materials of construction discussed here are based on historical designs as well as modern convertors operating at lower power levels. This notional design indicates convertors primarily made of metallic components that experience minimal change in mechanical properties for fast neutron fluences less than 10(sup 20) neutrons per square centimeter. However, these radiation effects can impact the magnetic and electrical properties of metals at much lower fluences than are crucial for mechanical property integrity. Moreover, a variety of polymeric materials are also used in common free-piston Stirling designs for bonding, seals, lubrication, insulation and others. Polymers can be affected adversely by radiation doses as low as 10(sup 5) - 10(sup 10) rad. Additionally, the absorbing dose rate, radiation hardness, and the resulting effect (either hardening or softening) varies depending on the nature of the particular polymer. The classes of polymers currently used in convertor fabrication are discussed along possible substitution options. Thus, the materials of construction of prototypic Stirling

convertor engines have been considered and the component materials susceptible to damage at the lowest neutron fluences have been identified.
Author
Fission; Free-Piston Engines; Radiation Effects; Sensitivity; Power Converters; Magnetic Materials; Space Power Reactors; Stirling Engines

20070022359 NASA Glenn Research Center, Cleveland, OH, USA
Electronic Repair Concepts for Long-Duration Spaceflight
Easton, John; Pettegrew, Richard D.; Struk, Peter M.; January 08, 2007; 8 pp.; In English; 45th AIAA Aerospace Sciences Conference, 8-11 Jan. 2007, Reno, NV, USA; Original contains color illustrations
Contract(s)/Grant(s): NCC3-975
Report No.(s): AIAA Paper 2007-0545; No Copyright; Avail.: CASI: A02, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022359

Constraints on the mass and volume that can be allocated for electronics spares and repair equipment on long-duration space missions mean that NASA must look at repair strategies beyond the traditional approach, which has been to replace faulty subsystems in a modular form, termed Orbital Replacement Units or Line Replacement Units. Other possible strategies include component and board-level replacement, modular designs that allow reprogramming of less-critical systems to take the place of more critical failed systems, and a blended approach which uses elements of each of these approaches, along with a limited number of Line Replacement Units. This paper presents some of the constraints and considerations that affect the decision on how to approach electronics repair for long duration space missions, and discusses the benefits and limitations of each of the previously mentioned strategies.
Author
Long Duration Space Flight; Electronics; Maintenance; Systems Engineering; Manned Space Flight

20070022444 NASA Glenn Research Center, Cleveland, OH, USA
Operational Results From a High Power Alternator Test Bed
Birchenough, Arthur; Hervol, David; January 05, 2007; 15 pp.; In English; Space Technology and Applications International Forum (STAIF) University of New Mexico's Institute for Space and Nuclear Power Studies, 11-15 Feb. 2007, Albuquerque, NM, Mexico; Original contains color illustrations
Contract(s)/Grant(s): NNC06BA07B; WBS 463169.04.03
Report No.(s): NASA/TM-2007-214708; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022444

The Alternator Test Unit (ATU) in the Lunar Power System Facility (LPSF) located at the NASA Glenn Research Center (GRC) in Cleveland, Ohio was used to simulate the operating conditions and evaluate the performance of the ATU and its interaction with various LPSF components in accordance with the current Fission Surface Power System (FSPS) requirements. The testing was carried out at the breadboard development level. These results successfully demonstrated excellent ATU power bus characteristics and rectified user load power quality during steady state and transient conditions. Information gained from this work could be used to assist the design and primary power quality considerations for a possible future FSPS. This paper describes the LPSF components and some preliminary test results.
Author
AC Generators; Test Facilities; Permanent Magnets; Power Supply Circuits; Electric Power Supplies

20070022512 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
The Environmental Performance at Low Intensity, Low Temperature (LILT) of High Efficiency Triple Junction Solar Cells
Stella, Paul M.; Mueller, Robert; Davis, Gregory; Distefano, Salvador; August 16, 2004; 8 pp.; In English; 2nd Annual International Energy Conversion Engineering Conference (IECEC), 16-19 Aug. 2004, Providence, RI, USA; Original contains black and white illustrations; Copyright; Avail.: Other Sources
ONLINE: http://hdl.handle.net/2014/39965

A number of JPL missions, either active or in the p l d g stages, require the accurate LILT flew intensity - low temperate) climate of triple-junction solar. Although triple ignition LILT performance was reported as recently as 2002, there has been an evolutionary advance in cell technology by both U.S. space cell manufacturers that, for mission design purposes, effectively obsoletes the earlier data. As a result, JPL initiated a program to develop a database for the LILT performance of the new high

performance triple junction solar cells. JPL obtained Emcore Advanced triple Juntion CIC assemblies and Spectrolab Ultra Triple Junction CIC assemblies. These cells were tested at temperature-intensity ranges designed to cover applications between 1 and 5.18 AU solar distances. 1 MeV electron irradiation from 25 E14 to 1 El5 w were performed on the cells to evaluate the combined effect of particulate radiation and LILT conditions. The effect of LILT conditions was observed to incur an increase in the variation of cell performances such that at simulted 5.18 AU conditions the average performance was approximately 30% with the best cells measuring between 32 and 34% efficiency. The 30% average efficiency compares with approximately 25% average efficiency measured on earlier technology triple junction solar cells.
Author
Low Temperature; Solar Cells; Intensity; Energy Conversion

20070022513 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Design of an Auto-zeroed, Differential, Organic Thin-film Field-effect Transistor Amplifier for Sensor Applications
Binkley, David M.; Verma, Nikhil; Crawford, Robert L.; Brandon, Erik; Jackson, Thomas N.; August 3, 2004; 12 pp.; In English; SPIE 49th International Symposium on Optical Science and Technology Annual Meeting, 2-6 Aug. 2004, Denver, CO, USA; Original contains black and white illustrations; Copyright; Avail.: Other Sources
ONLINE: http://hdl.handle.net/2014/39974

Organic strain gauge and other sensors require high-gain, precision dc amplification to process their low-level output signals. Ideally, amplifiers would be fabricated using organic thin-film field-effect transistors (OTFT's) adjacent to the sensors. However, OTFT amplifiers exhibit low gain and high input-referred dc offsets that must be effectively managed. This paper presents a four-stage, cascaded differential OTFT amplifier utilizing switched capacitor auto-zeroing. Each stage provides a nominal voltage gain of four through a differential pair driving low-impedance active loads, which provide common-mode output voltage control. p-type pentacence OTFT's are used for the amplifier devices and auto-zero switches. Simulations indicate the amplifier provides a nominal voltage gain of 280 V/V and effectively amplifies a 1-mV dc signal in the presence of 500-mV amplifier input-referred dc offset voltages. Future work could include the addition of digital gain calibration and offset correction of residual offsets associated with charge injection imbalance in the differential circuits.
Author
Differential Amplifiers; Field Effect Transistors; Thin Films; Sensors; Fabrication

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*.

20070022279 NASA Johnson Space Center, Houston, TX, USA, Arnold Engineering Development Center, Silver Spring, MD, USA
Continued Development of a Global Heat Transfer Measurement System at AEDC Hypervelocity Wind Tunnel 9
Kurits, Inna; Lewis, M. J.; Hamner, M. P.; Norris, Joseph D.; [2007]; 17 pp.; In English; 22nd International Congress on Instrumentation in Aerospace Simulation Facilities, 10-14 Jun. 2007, Pacific Grove, CA, USA; Original contains color illustrations; Copyright; Avail.: CASI: A03, Hardcopy

Heat transfer rates are an extremely important consideration in the design of hypersonic vehicles such as atmospheric reentry vehicles. This paper describes the development of a data reduction methodology to evaluate global heat transfer rates using surface temperature-time histories measured with the temperature sensitive paint (TSP) system at AEDC Hypervelocity Wind Tunnel 9. As a part of this development effort, a scale model of the NASA Crew Exploration Vehicle (CEV) was painted with TSP and multiple sequences of high resolution images were acquired during a five run test program. Heat transfer calculation from TSP data in Tunnel 9 is challenging due to relatively long run times, high Reynolds number environment and the desire to utilize typical stainless steel wind tunnel models used for force and moment testing. An approach to reduce TSP data into convective heat flux was developed, taking into consideration the conditions listed above. Surface temperatures from high quality quantitative global temperature maps acquired with the TSP system were then used as an input into the algorithm. Preliminary comparison of the heat flux calculated using the TSP surface temperature data with the value calculated using the standard thermocouple data is reported.
Author
Aerodynamic Heat Transfer; Hypervelocity Wind Tunnels; Wind Tunnel Models; Test Facilities; Aerospace Engineering; Crew Exploration Vehicle

20070022357 Sandia National Labs., Albuquerque, NM, USA

One-Dimensional Ablation with Pyrolysis Gas Flow Using a Full Newton's Method and Finite Control Volume Procedure

Amar, Adam J.; Blackwell, Ben F.; Edwards, Jack R.; June 25, 2007; 21 pp.; In English; 39th AIAA Thermophysics Conference, 25-28 June 2007, Miami, FL, USA; Original contains color illustrations

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

Report No.(s): AIAA Paper 2007-4535; Copyright; Avail.: CASI: A03, Hardcopy

The development and verification of a one-dimensional material thermal response code with ablation is presented. The implicit time integrator, control volume finite element spatial discretization, and Newton's method for nonlinear iteration on the entire system of residual equations have been implemented and verified for the thermochemical ablation of internally decomposing materials. This study is a continuation of the work presented in 'One-Dimensional Ablation with Pyrolysis Gas Flow Using a Full Newton's Method and Finite Control Volume Procedure' (AIAA-2006-2910), which described the derivation, implementation, and verification of the constant density solid energy equation terms and boundary conditions. The present study extends the model to decomposing materials including decomposition kinetics, pyrolysis gas flow through the porous char layer, and a mixture (solid and gas) energy equation. Verification results are presented for the thermochemical ablation of a carbon-phenolic ablator which involves the solution of the entire system of governing equations.

Author

Ablation; Gas Flow; Mechanical Properties; Pyrolysis; Newton Methods; Thermochemistry

20070022410 NASA Glenn Research Center, Cleveland, OH, USA

Time-Resolved PIV for Space-Time Correlations in Hot Jets

Wernet, Mark P.; June 10, 2007; 11 pp.; In English; International Congress on Instrumentation for use in Aerospace Simulation Facilities, 10-14 Jun. 2007, Pacific Grove, CA, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 599489.02.07.03.06.02.01; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022410

Temporally Resolved Particle Image Velocimetry (TR-PIV) is being used to characterize the decay of turbulence in jet flows a critical element for understanding the acoustic properties of the flow. A TR-PIV system, developed in-house at the NASA Glenn Research Center, is capable of acquiring planar PIV image frame pairs at up to 10 kHz. The data reported here were collected at Mach numbers of 0.5 and 0.9 and at temperature ratios of 0.89 and 1.76. The field of view of the TR-PIV system covered 6 nozzle diameters along the lip line of the 50.8 mm diameter jet. The cold flow data at Mach 0.5 were compared with hotwire anemometry measurements in order to validate the new TR-PIV technique. The axial turbulence profiles measured across the shear layer using TR-PIV were thinner than those measured using hotwire anemometry and remained centered along the nozzle lip line. The collected TR-PIV data illustrate the differences in the single point statistical flow properties of cold and hot jet flows. The planar, time-resolved velocity records were then used to compute two-point space-time correlations of the flow at the Mach 0.9 flow condition. The TR-PIV results show that there are differences in the convective velocity and growth rate of the turbulent structures between cold and hot flows at the same Mach number.

Author

Correlation; Particle Image Velocimetry; Space-Time Functions; Jet Flow; Aeroacoustics

20070022428 Boeing Aerospace Co., Houston, TX, USA

Spanwise Wing Loads on the Space Shuttle Orbiter during Roll Maneuver

Doggett, Glen P.; [2007]; 11 pp.; In English; 46th AIAA Aerospace Science Meeting, 7-10 January 2008, Reno, NV, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): NNJ06VA01C; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022428

Spanwise aerodynamic loads for the low-Mach, high-attitude portion of ascent for the Space Shuttle Orbiter are presented. In this Mach 0.3 flight regime, also called the roll maneuver, pre-stall and post-stall distributions of aerodynamic wing shear force, bending moment, and torsion moment were obtained from wind tunnel test data and computational fluid dynamics simulations of the Space Shuttle Launch Vehicle. The spanwise loads were computed by integration of surface pressure data. The existing historical operational database of spanwise wing loads for the Orbiter does not cover this low-Mach, high-attitude condition, however for Mach 0.6 low-attitude conditions the experimental and computational results compare well with the

operational data which has been validated by past flight measurements. Spanwise load distributions exhibit typical delta-wing characteristics. The computational results capture well the peak loading condition in the pre-stall case, but show more load relief for the post-stall case than was observed in the wind tunnel test data.
Author
Computational Fluid Dynamics; Roll; Space Shuttle Orbiters; Wind Tunnel Tests; Wing Loading; Spacecraft Maneuvers; Spanwise Blowing

20070022506 NASA Glenn Research Center, Cleveland, OH, USA
Experimental Investigation of Unsteady Thrust Augmentation Using a Speaker-Driven Jet
Paxson, Daniel E.; Wernet, Mark P.; John, Wentworth T.; AIAA Journal; March 2007; Volume 45, No. 3, pp. 607-614; In English; Original contains black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy
ONLINE: http://dx.doi.org/10.2514/1.18449

An experimental investigation is described in which a simple speaker-driven jet was used as a pulsed thrust source (driver) for an ejector configuration. The objectives of the investigation were twofold. The first was to expand the experimental body of evidence showing that an unsteady thrust source, combined with a properly sized ejector generally yields higher thrust augmentation values than a similarly sized, steady driver of equivalent thrust. The second objective was to identify characteristics of the unsteady driver that may be useful for sizing ejectors, and for predicting the thrust augmentation levels that may be achieved. The speaker-driven jet provided a convenient source for the investigation because it is entirely unsteady (i.e., it has no mean velocity component) and because relevant parameters such as frequency, time-averaged thrust, and diameter are easily variable. The experimental setup will be described, as will the two main measurements techniques employed. These are thrust and digital particle imaging velocimetry of the driver. It will be shown that thrust augmentation values as high as 1.8 were obtained, that the diameter of the best ejector scaled with the dimensions of the emitted vortex, and that the so-called formation time serves as a useful dimensionless parameter by which to characterize the jet and predict performance.
Author
Thrust Augmentation; Unsteady Flow; Ejectors; Mathematical Models; Jet Flow; Pulsejet Engines

20070022622 NASA Glenn Research Center, Cleveland, OH, USA
Flame Radiation, Structure, and Scalar Properties in Microgravity Laminar Fires
Feikema, Douglas; Lim, Jongmook; Sivathanu, Yudaya; June 2007; 23 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 January 2007, Reno, NV, USA; Original contains color illustrations
Contract(s)/Grant(s): NAS3-01085; E-15833; AIAA Paper-2007-0734
Report No.(s): NASA/TM-2007-214683; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022622

Results from microgravity combustion experiments conducted in the Zero Gravity Research Facility (ZGF) 5.18 second drop facility are reported. The results quantify flame radiation, structure, and scalar properties during the early phase of a microgravity fire. Emission mid-infrared spectroscopy measurements have been completed to quantitatively determine the flame temperature, water and carbon dioxide vapor concentrations, radiative emissive power, and soot concentrations in microgravity laminar methane/air, ethylene/nitrogen/air and ethylene/air jet flames. The measured peak mole fractions for water vapor and carbon dioxide are found to be in agreement with state relationship predictions for hydrocarbon/air combustion. The ethylene/air laminar flame conditions are similar to previously reported results including those from the flight project, Laminar Soot Processes (LSP). Soot concentrations and gas temperatures are in reasonable agreement with similar results available in the literature. However, soot concentrations and flame structure dramatically change in long-duration microgravity laminar diffusion flames as demonstrated in this report.
Author
Fires; Laminar Flow; Microgravity; Radiation; Diffusion Flames; Jet Flow; Research Facilities

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*.

20070022263 NASA Langley Research Center, Hampton, VA, USA, Science and Technology Corp., Hampton, VA, USA
2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter
Petros, Mulugeta; Yu, Jirong; Trieu, Bo; Bai, Yingxin; Petzar, Paul; Singh, Upendra N.; Reithmaier, Karl; May 06, 2007; 2 pp.; In English; CLEO/QELS 07 - Conference on Lasers and Electro-Optics and Quantum Electronics and Laser Science Conference, 6-11 May 2007, Baltimore, MD, USA; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

2 micron solid-state lasers are the primary choice for coherent Doppler wind detection. As wind lidars, they are used for wake vortex and clear air turbulence detection providing air transport safety. In addition, 2 micron lasers are one of the candidates for CO2 detection lidars. The rich CO2 absorption line around 2 micron, combined with the long upper state life of time, has made Ho based 2 micron lasers a viable candidate for CO2 sensing DIAL instrument. The design and fabrication of a compact coherent laser radar transmitter for Troposphere wind sensing is under way. This system is hardened for ground as well as airborne applications. As a transmitter for a coherent wind lidar, this laser has stringent spectral line width and beam quality requirements. Although the absolute wavelength does not have to be fixed for wind detection, to maximize return signal, the output wavelength should avoid atmospheric CO2 and H2O absorption lines. The base line laser material is Ho:Tm:LuLF which is an isomorph of Ho:Tm:YLF. LuLF produces 20% more output power than Ho:Tm:YLF. In these materials the Tm absorption cross-section, the Ho emission cross-section, the Tm to Ho energy transfer parameters and the Ho (sup 5) I (sub 7) radiative life time are all identical. However, the improved performance of the LuLF is attributed to the lower thermal population in the (sup 5) I (sub 8) manifold. It also provides higher normal mode to Q-switch conversion than YLF at high pump energy indicating a lower up-conversion. The laser architecture is composed of a seed laser, a ring oscillator, and a double pass amplifier. The seed laser is a single longitudinal mode with a line width of 13 KHz. The 100mJ class oscillator is stretched to 3 meters to accommodate the line-width requirement without compromising the range resolution of the instrument. The amplifier is double passed to produce greater than 300mJ energy.
Derived from text
Atmospheric Composition; Carbon Dioxide; Coherent Radar; Detection; Lasers; Optical Radar; Solid State Lasers; YLF Lasers

20070022264 NASA Langley Research Center, Hampton, VA, USA
Highly Efficient Q-switched Ho:YLF Laser Pumped by Tm:Fiber Laser
Yu, Jirong; Bai, Yingxin; Petros, M.; Petzar, Paul; Trieu, Bo; Lee, Hyung; Singh, U.; May 06, 2007; 2 pp.; In English; CLEO/QELS 07 - Conference on Lasers and Electro-Optics and Quantum Electronics and Laser Science Conference, 6-11 May 2007, Baltimore, MD, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

A highly efficient Q-switched Ho:YLF laser pumped by a Tm:fiber laser has been designed and demonstrated. When the pump power is 30 W, the pulse energy is 30mJ at the repetition rate of 100Hz.
Author
Q Switched Lasers; Laser Pumping; YLF Lasers; Holmium; Thulium

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*.

20070022345 NASA Johnson Space Center, Houston, TX, USA
Guide for Oxygen Compatibility Assessments on Oxygen Components and Systems
Rosales, Keisa R.; Shoffstall, Michael S.; Stoltzfus, Joel M.; May 14, 2007; 6 pp.; In English; Second IAASS Conference - Space Safety in a Global World, 14-16 May 2007, Chicago, IL, USA; Copyright; Avail.: CASI: A02, Hardcopy

A viewgraph presentation evaluating the compatibility of oxygen components and systems is shown. The topics include:

1) Application; 2) Gaining Wide Subscription; 3) Approach; 4) Establish Worst-Case Operating Conditions; 5) Assess Materials Flammability; 6) Evaluate Ignition Mechanisms; 7) Evaluate Kindling Chain; 8) Determine Reaction Affect; 9) Document Results; 10) Example of Documentation; and 11) Oxygen Compatibility Assessment Team.
CASI
Compatibility; Oxygen; Mechanical Engineering; Technology Assessment; Oxygen Supply Equipment

20070022433 NASA Glenn Research Center, Cleveland, OH, USA
Design, Fabrication and Performance of Open Source Generation I and II Compliant Hydrodynamic Gas Foil Bearings
DellaCorte, Christopher; Radil, Kevin C.; Bruckner, Robert J.; Howard, S. Adam; April 18, 2007; 22 pp.; In English; ASME/STEL International Joint Tribology Conference, 22-24 October 2007, San Diego, CA, USA; Original contains black and white illustrations
Report No.(s): NASA/TM-2007-214691; ARL-TR-4102; E-15879; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022433

Foil gas bearings are self-acting hydrodynamic bearings made from sheet metal foils comprised of at least two layers. The innermost top foil layer traps a gas pressure film that supports a load while a layer or layers underneath provide an elastic foundation. Foil bearings are used in many lightly loaded, high-speed turbo-machines such as compressors used for aircraft pressurization, and small micro-turbines. Foil gas bearings provide a means to eliminate the oil system leading to reduced weight and enhanced temperature capability. The general lack of familiarity of the foil bearing design and manufacturing process has hindered their widespread dissemination. This paper reviews the publicly available literature to demonstrate the design, fabrication and performance testing of both first and second generation bump style foil bearings. It is anticipated that this paper may serve as an effective starting point for new development activities employing foil bearing technology.
Author
Fabrication; Foil Bearings; Gas Bearings; Hydrodynamics; Mechanical Engineering; Turbomachinery

20070022441 Army Research Lab., Cleveland, OH, USA, NASA Glenn Research Center, Cleveland, OH, USA
Investigation of Low-Cycle Bending Fatigue of AISI 9310 Steel Spur Gears
Handschuh, Robert F.; Krantz, Timothy L.; Lerch, Bradley A.; Burke, Christopher S.; [2007]; 7 pp.; In English; 10th ASME International Power Transmission and Gearing Conference, 4-7 September 2007, Las Vegas, NV, USA; Original contains color illustrations
Report No.(s): DETC2007-34095; Copyright; Avail.: Other Sources

An investigation of the low-cycle bending fatigue of spur gears made from AISI 9310 gear steel was completed. Tests were conducted using the single-tooth bending method to achieve crack initiation and propagation. Tests were conducted on spur gears in a fatigue test machine using a dedicated gear test fixture. Test loads were applied at the highest point of single tooth contact. Gear bending stresses for a given testing load were calculated using a linear-elastic finite element model. Test data were accumulated from 1/4 cycle to several thousand cycles depending on the test stress level. The relationship of stress and cycles for crack initiation was found to be semilogarithmic. The relationship of stress and cycles for crack propagation was found to be linear. For the range of loads investigated, the crack propagation phase is related to the level of load being applied. Very high loads have comparable crack initiation and propagation times whereas lower loads can have a much smaller number of cycles for crack propagation cycles as compared to crack initiation.
Author
Bending Fatigue; Steels; Gear Teeth; Mechanical Engineering; Fatigue Tests

20070022471 NASA Goddard Space Flight Center, Greenbelt, MD, USA
A Method for Determining Autoignition Temperatures Resulting from Varying Rapid Rise Rates
Hagopian, Michael; McCardle, Kenneth; McDougle, Stephen; Saulsberry, Regor; Sipes, William; July 08, 2007; 25 pp.; In English; 43rd AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit, 8-11 July 2007, Cincinnati, OH, USA; Original contains color illustrations; Copyright; Avail.: CASI: A03, Hardcopy

Pyrotechnic and explosive devices are widely used in the aerospace industry to provide reliable, lightweight initiation components in ignition systems, cartridge actuated devices, escape and ejection systems, and many other applications. There are two major mechanisms for initiation of the pyrotechnic powders: heat and shock. Of powders initiated by heat, we have little information on the temperature required for ignition in the normal functioning time (milliseconds) of the device. The known autoignition temperatures obtained from standard tests provide data from days down to minutes with temperatures

increasing as heating time decreases. In order to better understand this relationship, and to make computer models, improved data are needed.
Author
Ignition Systems; Pyrotechnics; Ignition Temperature; Automatic Control; Spontaneous Combustion; Powder (Particles)

20070022618 Army Research Lab., Cleveland, OH, USA
Operational Condition and Superfinishing Effect on High-Speed Helical Gearing System Performance
Handschuh, R.; Kilmain, C.; Ehinger, R.; June 2007; 20 pp.; In English; American Helicopter Society 63rd Annual Forum and Technology Display, 1-3 May 2007, Virginia Beach, VA, USA; Original contains color illustrations
Report No.(s): NASA/TM-2007-214696; ARL-TR-4099; E-15897; Copyright; Avail.: CASI: A03, Hardcopy

An experimental effort has been conducted on an aerospace-quality helical gear train to investigate the thermal behavior of the gear system. Oil inlet temperature was varied from 160 to 250 F. Also, the test gears were run in both an as-ground condition and after isotropic superfinishing (ISF) condition. In-depth temperature measurements were made across the face width and at the axial end of the gear mesh. Supply power measurements were made at varying speeds and loads up to 5000 hp and 15000 rpm (pitch line velocity to 24000 feet per minute). Test results from the parametric studies and the superfinishing process are presented. The tests indicated that superfinishing offered no improvement in performance due to the high lubricant film thickness generated by the extremely high pitch line velocity that the majority of the tests were conducted. Increasing lubricant inlet temperature had the most dramatic effect on performance improvement.
Author
Gears; High Speed; Transmissions (Machine Elements); Thermodynamics; Test Facilities; Finishes; Temperature Effects

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*.

20070022225 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Time Series Vegetation Aerodynamic Roughness Fields Estimated from MODIS Observations
Borak, Jordan S.; Jasinski, Michael F.; Crago, Richard D.; Agricultural and Forest Meteorology; 2005; ISSN 0168-1923; Volume 135, pp. 252-268; In English; Original contains color illustrations; Copyright; Avail.: Other Sources
ONLINE: http://dx.doi.org/10.1016/j.agrformet.2005.12.006

Most land surface models used today require estimates of aerodynamic roughness length in order to characterize momentum transfer between the surface and atmosphere. The most common method of prescribing roughness is through the use of empirical look-up tables based solely on land cover class. Theoretical approaches that employ satellite-based estimates of canopy density present an attractive alternative to current look-up table approaches based on vegetation cover type that do not account for within-class variability and are oftentimes simplistic with respect to temporal variability. The current research applies Raupach s formulation of momentum aerodynamic roughness to MODIS data on a regional scale in order to estimate seasonally variable roughness and zero-plane displacement height fields using bulk land cover parameters estimated by [Jasinski, M.F., Borak, J., Crago, R., 2005. Bulk surface momentum parameters for satellite-derived vegetation fields. Agric. For. Meteorol. 133, 55-68]. Results indicate promising advances over look-up approaches with respect to characterization of vegetation roughness variability in land surface and atmospheric circulation models.
Author
Time Series Analysis; Aerodynamics; Surface Roughness; Atmospheric Models; Estimates; Momentum Transfer; Atmospheric Circulation; Satellite Observation; Vegetation; MODIS (Radiometry)

20070022274 NASA Stennis Space Center, Stennis Space Center, MS, USA, Science Systems and Applications, Inc., Bay Saint Louis, MS, USA
A Rapidly Prototyped Vegetation Dryness Index Evaluated for Wildfire Risk Assessment at Stennis Space Center
Ross, Kenton; Graham, William; Prados, Don; Spruce, Joseph; May 06, 2007; 31 pp.; In English; ASPRS 2007 Annual Conference, 6-11 May 2007, Tampa, FL, USA; Original contains color illustrations
Contract(s)/Grant(s): NNS04AB54T
Report No.(s): SSTI-2220-0084; Copyright; Avail.: CASI: A03, Hardcopy

MVDI, which effectively involves the differencing of NDMI and NDVI, appears to display increased noise that is

consistent with a differencing technique. This effect masks finer variations in vegetation moisture, preventing MVDI from fulfilling the requirement of giving decision makers insight into spatial variation of fire risk. MVDI shows dependencies on land cover and phenology which also argue against its use as a fire risk proxy in an area of diverse and fragmented land covers. The conclusion of the rapid prototyping effort is that MVDI should not be implemented for SSC decision support.
Derived from text
Forest Fires; Rapid Prototyping; Risk; Remote Sensing; Drying

20070022356 NASA Dryden Flight Research Center, Edwards, CA, USA
Earth Observations and the Role of UAVs: A Capabilities Assessment
Cox, Timothy H.; August 2006; 346 pp.; In English; Original contains color illustrations; Copyright; Avail.: CASI: C01, CD-ROM: A15, Hardcopy

This three-volume document, based on the draft document located on the website given on page 6, presents the findings of a NASA-led capabilities assessment of Uninhabited Aerial Vehicles (UAVs) for civil (defined as non-DoD) use in Earth observations. Volume 1 is the report that presents the overall assessment and summarizes the data. The second volume contains the appendices and references to address the technologies and capabilities required for viable UAV missions. The third volume is the living portion of this effort and contains the outputs from each of the Technology Working Groups (TWGs) along with the reviews conducted by the Universities Space Research Association (USRA). The focus of this report, intended to complement the Office of the Secretary of Defense UAV Roadmap, is four-fold: 1) To determine and document desired future Earth observation missions for all UAVs based on user-defined needs; 2) To determine and document the technologies necessary to support those missions; 3) To discuss the present state of the art platform capabilities and required technologies, including identifying those in progress, those planned, and those for which no current plans exist; 4) Provide the foundations for development of a comprehensive civil UAV roadmap. It is expected that the content of this report will be updated periodically and used to assess the feasibility of future missions. In addition, this report will provide the foundation to help influence funding decisions to develop those technologies that are considered enabling or necessary but are not contained within approved funding plans. This document is written such that each section will be supported by an Appendix that will give the reader a more detailed discussion of that section's topical materials.
Derived from text
Pilotless Aircraft; Technology Utilization; Earth Observations (From Space); Earth Sciences

20070022409 NASA Goddard Space Flight Center, Greenbelt, MD, USA, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, USA
International Laser Ranging Service (ILRS) 2003-2004 Annual Report
Pearlman, Michael, Editor; Noll, Carey, Editor; June 2005; 220 pp.; In English; Original contains black and white illustrations
Report No.(s): NASA/TP-2005-212780; Copyright; Avail.: CASI: A10, Hardcopy

The International Laser Ranging Service (ILRS) organizes and coordinates Satellite Laser Ranging (SLR) and Lunar Laser Ranging (LLR) to support programs in geodetic, geophysical, and lunar research activities and provides the International Earth Rotation and Reference Systems Service (IERS) with products important to the maintenance of an accurate International Terrestrial Reference Frame (ITRF). This reference frame provides the stability through which systematic measurements of the Earth can be made over thousands of kilometers, decades of time, and evolution of measurement technology. This 2003-2004 ILRS annual report is comprised of individual contributions from ILRS components within the international geodetic community for the years 2003-2004. The report documents changes and progress of the ILRS and is also available on the ILRS Web site at http://ilrs.gsfc.nasa.gov/reports/ilrs_reports/ilrsar_2003.html.
Author
Geodesy; Laser Ranging; Lunar Rangefinding

20070022447 NASA Langley Research Center, Hampton, VA, USA
Retrievals and Comparisons of Various MODIS-Spectrum Inferred Water Cloud Droplet Effective Radii
Fu-Lung, Chang; Minnis, Patrick; Lin, Bin; Sunny, Sun-Mack; Khaiyer, Mandana M.; March 26, 2007; 1 pp.; In English; 17th Annual ARM Science Team Meeting, 26-30 Mar. 2007, Monterey, CA, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 188362.02.07.8918.01; Copyright; Avail.: CASI: A01, Hardcopy

Cloud droplet effective radius retrievals from different Aqua MODIS nearinfrared channels (2.1- micrometer, 3.7-micrometer, and 1.6- micrometer) show considerable differences even among most confident QC pixels. Both Collection 004 and Collection 005 MOD06 show smaller mean effective radii at 3.7- micrometer wavelength than at 2.1- micrometer and 1.6-

micrometer wavelengths. Differences in effective radius retrievals between Collection 004 and Collection 005 may be affected by cloud top height/temperature differences, which mainly occur for optically thin clouds. Changes in cloud top height and temperature for thin clouds have different impacts on the effective radius retrievals from 2.1- micrometer, 3.7- micrometer, and 1.6- micrometer channels. Independent retrievals (this study) show, on average, more consistency in the three effective radius retrievals. This study is for Aqua MODIS only.
Author
Aqua Spacecraft; Drops (Liquids); MODIS (Radiometry); Clouds (Meteorology); Radii; Water; Spectrum Analysis

20070022483 Colorado State Univ., Fort Collins, CO, USA, NASA Goddard Space Flight Center, Greenbelt, MD, USA
Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S.
Matsui, Toshihisa; Kreidenweis, Sonia M.; Pielke, Roger A., Sr.; Schichtel, Bret; Yu, Hongbin; Chin, Mian; Chu, D. Allen; Niyogi, Dev; Geophysical Research Letters; November 02, 2004; Volume 31, L21101; 2 pp.; In English
Contract(s)/Grant(s): NNG04GB87G; Copyright; Avail.: Other Sources; Abstract Only
ONLINE: http://dx.doi.org/10.1029/2004GL021017

This study compares aerosol optical depths (AOD) products from the Moderate Resolution Imaging Spectroradiometer (MODIS) and the Goddard Chemistry Aerosol Radiation and Transport (GOCART) model and their integrated products with ground measurements across the eastern U.S. from March 1, 2000 to December 31, 2001. The Terra MODIS Level-3 (collection 4) AOD at 0.55 pm has better correlation, but consistently overestimates the values of the Aerosol Robotic Network (AERONET) measurements. GOCART has small biases for a 22-month integration, and slight positive biases are appeared for the cold season. These results are also supported by the comparison with the IMPROVE (Interagency Monitoring of Protected Visual Environments) light extinction index. The optimal interpolation improves the daily-scale RMSE from either MODIS or GOCART alone. However, the regional biases in the aerosol products constitute a major constraint to the optimal estimate of AOD.
Author
Aerosols; MODIS (Radiometry); Optical Thickness; Radiation Transport; Atmospheric Chemistry; United States; Regions

20070022508 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR
Tanner, A. B.; Wilson, W. J.; Kangaslahti, P. P.; Lambrigsten, B. H.; Dinardo, S. J.; Piepmeier, J. R.; Ruf, C. S.; Rogacki, S.; Gross, S. M.; Musko, S.; September 20, 2004; 4 pp.; In English; IEEE Geoscience and Remote Sensing Society (IGARSS), 20 Sep. 2004, Achorage, AK, USA; Original contains black and white illustrations; Copyright; Avail.: Other Sources
ONLINE: http://hdl.handle.net/2014/40000

Preliminary details of a 2-D synthetic aperture radiometer prototype operating from 50 to 55 GHz will be presented. The laboratory prototype is being developed to demonstrate the technologies and system design needed to do millimeter-wave atmospheric soundings with high spatial resolution from Geostationary orbit. The concept is to deploy a large thinned aperture Y-array on a geostationary satellite, and to use aperture synthesis to obtain images of the Earth without the need for a large mechanically scanned antenna. The laboratory prototype consists of a Y-array of 24 horn antennas, MMIC receivers, and a digital cross-correlation sub-system.
Author
Prototypes; Radiometers; Synthetic Apertures; Synchronous Satellites; Remote Sensing

20070022509 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
STAR Concept for Passive Microwave Temperature Sounding from Middle Earth Orbit (MeoSTAR)
Wilson, William J.; Tanner, Alan B.; Lambrigtsen, Bjorn H.; Doiron, Terence A.; Piepmeier, Jeffrey R.; Ruf, Chris S.; September 2004; 2 pp.; In English; IEEE Geoscience and Remote Sensing Society (IGARSS), September 2004, Anchorage, AK, USA; Original contains black and white illustrations; Copyright; Avail.: Other Sources
ONLINE: http://hdl.handle.net/2014/39969

A future mission for a new microwave atmospheric temperature sounder radiometer in a Middle Earth Orbit (MEO) at 11,000 km altitude is described. The MeoSTAR design uses a stationary l-dimensional Synthetic Thinned Array Radiometer in the 50-60 GHz microwave sounding band, to provide a 'pushbroom' image as the satellite orbits. The advantage of this concept is an image with a high spatial resolution and a wide swath with no scanning antenna to disturb the visual and IR sensors on the same satellite.
Author
Earth Orbits; Microwave Sounding; Temperature Profiles; Microwave Radiometers; Synthetic Arrays; Satellite Design

45
ENVIRONMENT POLLUTION

Includes atmospheric, water, soil, noise, and thermal pollution.

20070022424 NASA Stennis Space Center, Stennis Space Center, MS, USA
Environmental Assessment for the Construction and Operation of the Constellation Program A-3 Test Stand
Kennedy, Carolyn D.; May 2007; 55 pp.; In English; Original contains color illustrations
Report No.(s): SSTI-8500-0002; No Copyright; Avail.: CASI: A04, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022424

This document is an environmental assessment that examines the environmental impacts of a proposed plan to clear land and to construct a test stand for use in testing the J-2X rocket engine at simulated altitude conditions in support of NASA's Constellation Program.
Author
Construction; Test Stands; Environment Effects; Environment Protection; Environmental Quality; Man Environment Interactions; Rocket Engines

20070022426 NASA Glenn Research Center, Cleveland, OH, USA
Gas Emissions Acquired during the Aircraft Particle Emission Experiment (APEX) Series
Changlie, Wey; Chowen, Chou Wey; [2007]; 8 pp.; In English; 18th of International Society of Airbreathing Engines (ISABE) Conference, 2-7 Sept. 2007, Beijing, China; Original contains color illustrations
Contract(s)/Grant(s): WBS 561581.02.08.03.16.03
Report No.(s): ISABE-2007-1277; Copyright; Avail.: CASI: A02, Hardcopy

NASA, in collaboration with other US federal agencies, engine/airframe manufacturers, airlines, and airport authorities, recently sponsored a series of 3 ground-based field investigations to examine the particle and gas emissions from a variety of in-use commercial aircraft. Emissions parameters were measured at multiple engine power settings, ranging from idle to maximum thrust, in samples collected at 3 different down stream locations of the exhaust. Sampling rakes at nominally 1 meter down stream contained multiple probes to facilitate a study of the spatial variation of emissions across the engine exhaust plane. Emission indices measured at 1 m were in good agreement with the engine certification data as well as predictions provided by the engine company. However at low power settings, trace species emissions were observed to be highly dependent on ambient conditions and engine temperature.
Author
Civil Aviation; Exhaust Emission; Exhaust Gases; DC 8 Aircraft; Exhaust Systems; Gas Analysis

46
GEOPHYSICS

Includes Earth structure and dynamics, aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism. For related information see *47 Meteorology and Climatology*; and *93 Space Radiation*.

20070022536 Michigan State Univ., East Lansing, MI, USA
A Behavioral Model of Landscape Change in the Amazon Basin: The Colonist Case
Walker, R. A.; Drzyzga, S. A.; Li, Y. L.; Wi, J. G.; Caldas, M.; Arima, E.; Vergara, D.; Ecological Applications; 2004; Volume 14, No. 4: S299, pp. 299-312; In English
Contract(s)/Grant(s): NCC5-694; Copyright; Avail.: Other Sources; Abstract Only
ONLINE: http://dx.doi.org/10.1890/01-6004

This paper presents the prototype of a predictive model capable of describing both magnitudes of deforestation and its spatial articulation into patterns of forest fragmentation. In a departure from other landscape models, it establishes an explicit behavioral foundation for algorithm development, predicated on notions of the peasant economy and on household production theory. It takes a 'bottom-up' approach, generating the process of land-cover change occurring at lot level together with the geography of a transportation system to describe regional landscape change. In other words, it translates the decentralized decisions of individual households into a collective, spatial impact. In so doing, the model unites the richness of survey research on farm households with the analytical rigor of spatial analysis enabled by geographic information systems (GIs). The paper describes earlier efforts at spatial modeling, provides a critique of the so-called spatially explicit model, and elaborates a behavioral foundation by considering farm practices of colonists in the Amazon basin. It then uses, insight from the

behavioral statement to motivate a GIs-based model architecture. The model is implemented for a long-standing colonization frontier in the eastern sector of the basin, along the Trans-Amazon Highway in the State of Para, Brazil. Results are subjected to both sensitivity analysis and error assessment, and suggestions are made about how the model could be improved.
Author
Amazon Region (South America); Structural Basins; Models; Deforestation; Terrain

47
METEOROLOGY AND CLIMATOLOGY

Includes weather observation forecasting and modification.

20070022273 NASA Marshall Space Flight Center, Huntsville, AL, USA, National Weather Records Center, Asheville, NC, USA
An Overview of Climatic Elements
Crutcher, H. L.; Johnson, D. L.; March 2007; 548 pp.; In English; Original contains color and black and white illustrations
Report No.(s): NASA/TP-2007-214904; M-1184; No Copyright; Avail.: CASI: A23, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022273

This Technical Publication (TP) addresses some climatic elements with emphasis on atmospheric composition, including gas radiative characteristics. Solar radiation is discussed with considerable information on the mathematical and statistical formulae. On a worldwide basis, temperature and precipitation for the globe are discussed along with interaction in drought. Also included is the simultaneous interaction with winds, humidity, and solar radiation. Volcanology gets minimum treatment. The oceans and seas are treated in chart form along with the interrelationship of oceanic currents and El Nino and La Nina, and ENSO phenomena. Upper air circulations are discussed. Various cloud formations up to 85-95 km altitude are described. Information on tornadoes and hurricanes is also included. One section is devoted to the climate physical-chemical elements. A short discussion is given on the importance for the quality of data and/or information in descriptions of the climate. This TP presents only an overview or survey of these and other various climatic elements.
Author
Climatology; General Overviews; Weather; Earth Atmosphere; Precipitation (Meteorology)

20070022302 NASA Stennis Space Center, Stennis Space Center, MS, USA, Science Systems and Applications, Inc., USA
Assessing Hurricane Katrina Vegetation Damage at Stennis Space Center using IKONOS Image Classification Techniques
Graham, William D.; Spruce, Joseph P.; Ross, Kenton W.; May 06, 2007; 25 pp.; In English; ASPRS 2007 National Convention, 6-11 May 2007, Tampa, FL, USA; Original contains color illustrations
Contract(s)/Grant(s): NNS04AB54T
Report No.(s): SSTI-2220-0085; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022302

Hurricane Katrina hit southwestern Mississippi on August 29, 2005, at 9:45 a.m. CDT as a category 3 storm with surges up to approx. 9 m and sustained winds of approx. 120 mph. The hurricane's wind, rain, and flooding devastated several coastal towns, from New Orleans through Mobile. The storm also caused significant damage to infrastructure and vegetation of NASA's SSC (Stennis Space Center). Storm recovery at SSC involved not only repairs of critical infrastructure but also forest damage mitigation (via timber harvests and control burns to reduce fire risk). This presentation discusses an effort to use commercially available high spatial resolution multispectral IKONOS data for vegetation damage assessment, based on data collected over SSC on September 2, 2005.
Derived from text
Hurricanes; Image Classification; Vegetation; Damage Assessment; Wind (Meteorology); Remote Sensing

20070022448 NASA Langley Research Center, Hampton, VA, USA
Marine Boundary Layer Cloud Properties From AMF Point Reyes Satellite Observations
Jensen, Michael; Vogelmann, Andrew M.; Luke, Edward; Minnis, Patrick; Miller, Mark A.; Khaiyer, Mandana; Nguyen, Louis; Palikonda, Rabindra; March 26, 2007; 1 pp.; In English; 17th Annural ARM Science Team Meeting, 26-30 Mar. 2007, Monterey, CA, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 188362.02.07.8918.01; Copyright; Avail.: CASI: A01, Hardcopy

Cloud Diameter, C(sub D), offers a simple measure of Marine Boundary Layer (MBL) cloud organization. The diurnal

cycle of cloud-physical properties and C(sub D) at Pt Reyes are consistent with previous work. The time series of C(sub D) can be used to identify distinct mesoscale organization regimes within the Pt. Reyes observation period.
Derived from text
Marine Meteorology; Boundary Layers; Cloud Physics; Satellite Observation

20070022449 NASA Langley Research Center, Hampton, VA, USA
A Comparison of Satellite-Based Multilayered Cloud Detection Methods
Minnis, Patrick; Chang, Fu-Lung; Khaiyer, Mandana M.; Ayers, Jeffrey K.; Palikonda, Rabindra; Nordeen, Michele L.; Spangenberg, Douglas A.; March 26, 2007; 1 pp.; In English; 17th Annual ARM Science Team Meeting, 26-30 Mar. 2007, Monterey, CA, USA; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Both techniques show skill in detecting multilayered clouds, but they disagree more than 50% of the time. BTD method tends to detect more ML clouds than CO2 method and has slightly higher detection accuracy. CO2 method might be better for minimizing false positives, but further study is needed. Neither method as been optimized for GOES data. BTD technique developed on AVHRR, better BTD signals & resolution. CO2 developed on MODIS, better resolution & 4 CO2 channels. Many additional comparisons with ARSCL data will be used to optimize both techniques. A combined technique will be examined using MODIS & Meteosat-8 data. After optimization, the techniques will be implemented in the ARM operational satellite cloud processing.
Derived from text
Detection; Clouds (Meteorology); Cloud Physics; MODIS (Radiometry); Meteosat Satellite

20070022457 NASA Langley Research Center, Hampton, VA, USA
Comparison of TWP-ICE Satellite and Field Campaign Aircraft Derived Cloud Properties
Ayers, J. K.; Minnis, Patrick; Spangenberg, Douglas A.; Nordeen, Michele L.; Khaiyer, Mandana M.; Palikonda, Rabindra; Nguyen, Louis; Phan, Dung N.; March 26, 2007; 1 pp.; In English; 17th Annual ARM Science Team Meeting, 26-30 Mar. 2007, Monterey, CA, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 188362.02.07.8918.01; ITF 18971; Copyright; Avail.: CASI: A01, Hardcopy

Cloud and radiation products derived from the MTSAT-1R satellite have been developed for TWP-ICE. These include pixel-level, gridded, and ground site and aircraft matched. These products are available from the Langley website and the ARM data center. As shown in Figs 2, and 4-6, these products compare favorably with in-situ ground and aircraft based measurements. With additional quantitative validation these products can provide valuable information about tropical convection and its impact on the radiation budget and climate. As new algorithm improvements, such as multi-layer cloud detection, are implemented these products will be reprocessed and updated.
Author
Cloud Physics; Tropical Regions; Climatology; Clouds (Meteorology)

20070022475 NASA Goddard Space Flight Center, Greenbelt, MD, USA, Colorado State Univ., Fort Collins, CO, USA
Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle
Matsui, Toshihisa; Masunaga, Hirohiko; Kreidenweis, Sonia M.; Pielke, Roger A., Sr.; Tao, Wei-Kuo; Chin, Mian; Kaufman, Yoram J.; Journal of Geophysical Research; September 09, 2006; Volume 111, D17204; 2 pp.; In English
Contract(s)/Grant(s): NNG04GB87G; Copyright; Avail.: Other Sources; Abstract Only
ONLINE: http://dx.doi.org/10.1029/2005JD006097

This study examines variability in marine low cloud properties derived from semi-global observations by the Tropical Rainfall Measuring Mission (TRMM) satellite, as linked to the aerosol index (AI) and lower-tropospheric stability (LTS). AI is derived from the Moderate Resolution Imaging Spectroradiometer (Terra MODIS) sensor and the Goddard Chemistry Aerosol Radiation and Transportation (GOCART) model, and is used to represent column-integrated aerosol concentrations. LTS is derived from the NCEP/NCAR reanalysis, and represents the background thermodynamic environment in which the clouds form. Global statistics reveal that cloud droplet size tends to be smallest in polluted (high-AI) and strong inversion (high-LTS) environments. Statistical quantification shows that cloud droplet size is better correlated with AI than it is with LTS. Simultaneously, the cloud liquid water path (CLWP) tends to decrease as AI increases. This correlation does not support the hypothesis or assumption that constant or increased CLWP is associated with high aerosol concentrations. Global variability in corrected cloud albedo (CCA), the product of cloud optical depth and cloud fraction, is very well explained by LTS, while both AI and LTS are needed to explain local variability in CCA. Most of the local correlations between AI and

cloud properties are similar to the results from the global statistics, while weak anomalous aerosol-cloud correlations appear locally in the regions where simultaneous high (low) AI and low (high) LTS compensate each other. Daytime diurnal cycles explain additional variability in cloud properties. CCA has the largest diurnal cycle in high-LTS regions. Cloud droplet size and CLWP have weak diurnal cycles that differ between clean and polluted environments. The combined results suggest that investigations of marine low cloud radiative forcing and its relationship to hypothesized aerosol indirect effects must consider the combined effects of aerosols, thermodynamics, and the diurnal cycle.
Author
Aerosols; Cloud Physics; Diurnal Variations; TRMM Satellite; Atmospheric Chemistry; Stability; Marine Meteorology

20070022486 Colorado Univ., Boulder, CO, USA
A New Paradigm for Assessing the Role of Agriculture in the Climate System and in Climate Change
Pielke, Roger A., Sr.; Adegoke, Jimmy O.; Chase, Thomas N.; Marshall, Curtis H.; Matsui, Toshihisa; Niyogi, Dev; Agricultural and Forest Meteorology; February 12, 2007; Volume 142, Issues 2-4, pp. 234-254; In English
Contract(s)/Grant(s): NNG04GB87C; Copyright; Avail.: Other Sources; Abstract Only
ONLINE: http://dx.doi.org/10.1016/j.agrformet.2006.06.012

This paper discusses the diverse climate forcings that impact agricultural systems, and contrasts the current paradigm of using global models downscaled to agricultural areas (a top-down approach) with a new paradigm that first assesses the vulnerability of agricultural activities to the spectrum of environmental risk including climate (a bottom-up approach). To illustrate the wide spectrum of climate forcings, regional climate forcings are presented including land-use/land-cover change and the influence of aerosols on radiative and biogeochemical fluxes and cloud/precipitation processes, as well as how these effects can be teleconnected globally. Examples are presented of the vulnerability perspective, along with a small survey of the perceived drought impacts in a local area, in which a wide range of impacts for the same precipitation deficits are found. This example illustrates why agricultural assessments of risk to climate change and variability and of other environmental risks should start with a bottom-up perspective.
Author
Agriculture; Biogeochemistry; Climate Change; Cloud Physics

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*.

20070022351 Louisville Univ., KY, USA, NASA Johnson Space Center, Houston, TX, USA
Comparative MicroRNA Expression Patterns in Fibroblasts after Low and High Doses of Low-LET Radiation Exposure
Maes, Olivier C.; Xu, Suying; Hada, Megumi; Wu, Honglu; Wang, Eugenia; July 13, 2007; 1 pp.; In English; 18th Annual NASA Space Radiation Investigators' Workshop, 13-15 July 2007, Rohnert Park, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

Exposure to ionizing radiation causes DNA damage to cells, and provokes a plethora of cellular responses controlled by unique gene-directed signaling pathways. MicroRNAs (miRNAs) are small (~22-nucleotide), non-coding RNAs which functionally silence gene expression by either degrading the messages or inhibiting translation. Here we investigate radiation-dependent changes in these negative regulators by comparing the expression patterns of all 462 known human miRNAs in fibroblasts, after exposure to low (0.1 Gy) or high (2 Gy) doses of X-rays at 30 min, 2, 6 and 24 hrs post-treatment. The expression patterns of microRNAs after low and high doses of radiation show a similar qualitative down-regulation trend at early (0.5 hr) and late (24 hr) time points, with a quantitatively steeper slope following the 2 Gy exposures. Interestingly, an interruption of this downward trend is observed after the 2 Gy exposure, i.e. a significant up-regulation of microRNAs at 2 hrs, then reverting to the downward trend by 6 hrs; this interruption at the intermediate time point was not observed with the 0.1 Gy exposure. At the early time point (0.5 hr), candidate gene targets of selected down-regulated microRNAs, common to both 0.1 and 2 Gy exposures, were those functioning in chromatin remodeling. Candidate target genes of unique up-regulated microRNAs seen at a 2 hr intermediate time point, after the 2 Gy exposure only, are those involved in cell death signaling. Finally, putative target genes of down-regulated microRNAs seen at the late (24 hr) time point after either doses of radiation are those involved in the up-regulation of DNA repair, cell signaling and homeostasis. Thus we hypothesize that

after radiation exposure, microRNAs acting as hub negative regulators for unique signaling pathways needed to be down-regulated so as to de-repress their target genes for the proper cellular responses, including DNA repair and cell maintenance. The unique microRNAs up-regulated at 2 hr after 2 Gy suggest the cellular response to functionally suppress the apoptotic death signaling reflex after exposure to high dose radiation. Further analyses with transcriptome and global proteomic profiling will validate the reciprocal expression of signature microRNAs selected in our radiation-exposed cells, and their candidate target gene families, and test our hypothesis that unique radiation-specific microRNAs are keys in governing signaling responses for damage control of this environmental hazard.
Author
Exposure; Fibroblasts; Radiation Dosage; Ribonucleic Acids; Gene Expression; Ionizing Radiation

20070022353 NASA Johnson Space Center, Houston, TX, USA
Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays
Zhang, Ye; Mehta, Satish; Hammond, Diane; Pierson, Duane; Jeevarajan, Antony; Cucinotta, Francis; Rohde, Larry; Wu, Honglu; July 13, 2007; 1 pp.; In English; 18th Annual NASA Space Radiation Investigators' Workshop, 13-15 July 2007, Rohnert Park, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

Understanding of the molecular response to low-dose and low-dose-rate radiation exposure is essential for the extrapolation of high-dose radiation risks to those at dose levels relevant to space and other environmental concerns. Most of the reported studies of gene expressions induced by low-dose or low-dose-rate radiation were carried out on exponentially growing cells. In the present study, we analyzed expressions of 84 genes associated with DNA damage sensing using real time PCR in human fibroblasts in mostly G1 phase of the cell cycle. The cells were exposed continuously to gamma rays at a dose rate of 0.8 cGy/hr for 1, 2, 6 or 24 hrs at 37 C throughout the exposure. The total RNA was isolated immediately after the exposure was terminated. Of the 84 genes, only a few showed significant changes of the expression level. Some of the genes (e.g. DDit3 and BTG2) were found to be up or down regulated only after a short period of exposure, while other genes (e.g. PRKDC) displayed a highest expression level at the 24 hr time point. The expression profiles for the exposed cells which had a smaller portion of G1 cells indicated more cell cycle signaling and DNA repair genes either up or down regulated. Interestingly, the panel of genes changed from radiation exposure in G1 cells is different from the panel in cells having less G1 arrest cells. The gene expression profile of the cells responding to low-dose-radiation insult apparently depends on the cell growth stage. The response pathway in G1 cells may differ from that in exponentially growing cells.
Author
Cell Division; Deoxyribonucleic Acid; Fibroblasts; Gamma Rays; Gene Expression; Radiation Dosage; Apoptosis

20070022354 NASA Johnson Space Center, Houston, TX, USA, Chiba Univ., Chiba, Japan
Chromosome Aberrations in Normal and Ataxia-Telangiectasia Cells Exposed to Heavy Ions
Kawata, T.; Ito, H.; Liu, C.; Shigematsu, N.; George, K.; Cucinota, F. A.; July 13, 2007; 1 pp.; In English; 18th Annual NASA Space Radiation Investigators' Workshop, 13-15 July 2007, Rohnert Park, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

Although cells derived from Ataxia Telangiectasia (AT) patients are known to exhibit abnormal responses to ionizing radiations, its underlying mechanism still remains unclear. Previously, the authors reported that at the same gamma-irradiation dose AT cells show higher frequencies of misrepair and deletions compared to normal human fibroblast cells. In this study, we investigated the effects of heavy ions beams on chromosomal aberrations in normal and AT cells. Normal and AT fibroblast cells arrested at G0/G1 phase were irradiated with 2 Gy of X-rays, 490 MeV/u Silicon (LET 55 keV/m), 500 MeV/u Iron (LET 185 keV/m) and 200 MeV/u Iron (LET 440 keV/m) particles, and then cells were allowed to repair for 24 hours at 37 degrees before subculture. Calyculin-A induced PCC method was employed to collect G2/M chromosomes and whole DNA probes 1 and 3 were used to analyze chromosomal aberrations such as color-junctions, deletions, simple exchanges (incomplete and reciprocal exanges) and complex-type exchanges. The percentages of aberrant cells were higher when normal and AT cells were exposed to heavy ions compared to X-rays, and had a tendency to increase with increasing LET up to 185 keV/m and then decreased at 440 keV/m. When the frequency of color-junctions per cell was compared after X-ray exposure, AT cells had around three times higher frequency of color-junctions (mis-rejoining) than normal cells. However, at 185 keV/m there was no difference in the frequency of color-junctions between two cell lines. It was also found that the frequency of simple exchanges per cell was almost constant in AT cells regardless LET levels, but it was LET dependent for normal cells. Interestingly, the frequency of simple exchanges was higher for AT cells when it was compared at 185 keV/m but AT cells had more complex-type exchanges at the same LET levels. Heavy ions are more efficient in inducing chromosome aberrations

in normal and AT cells compared to X-rays, and the aberration types between normal and AT fibroblast appeared different probably due to difference in the ATM gene function.
Author
Chromosome Aberrations; Cells (Biology); Heavy Ions; Radiation Dosage; Ataxia; Abnormalities

20070022365 NASA Glenn Research Center, Cleveland, OH, USA
Microvascular Branching as a Determinant of Blood Flow by Intravital Particle Imaging Velocimetry
Parsons-Wingerter, Patricia; McKay, Terri L.; Vickerman, Mary B.; Wernet, Mark P.; Myers, Jerry G.; Radhakrishnan, Krishnan; April 28, 2007; 2 pp.; In English; Microcirculatory Society 54th Annual Meeting, 28 Apr. - 2 May 2007, Washington, DC, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 667266.01.03.0543.01; Copyright; Avail.: CASI: A01, Hardcopy

The effects of microvascular branching on blood flow were investigated in vivo by microscopic particle imaging velocimetry (micro-PIV). We use micro-PIV to measure blood flow by tracking red blood cells (RBC) as the moving particles. Velocity flow fields, including flow pulsatility, were analyzed for the first four branching orders of capillaries, postcapillary venules and small veins of the microvascular network within the developing avian yolksac at embryonic day 5 (E5). Increasing volumetric flowrates were obtained from parabolic laminar flow profiles as a function of increasing vessel diameter and branching order. Maximum flow velocities increased approximately twenty-fold as the function of increasing vessel diameter and branching order compared to flow velocities of 100 - 150 micron/sec in the capillaries. Results from our study will be useful for the increased understanding of blood flow within anastomotic, heterogeneous microvascular networks.
Author
Blood Flow; Erythrocytes; Flow Velocity; Particle Image Velocimetry; Flow Distribution

20070022440 NASA Glenn Research Center, Cleveland, OH, USA
Two-Photon Fluorescence Microscopy for Biomedical Research
Fischer, David; Zimmerli, Greg; Asipauskas, Marius; April 24, 2007; 1 pp.; In English; 2007 Ohio Nanotechnology Summit, 24-25 April 2007, Akron, OH, USA; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

This viewgraph presentation gives an overview of two-photon microscopy as it applies to biomedical research. The topics include: 1) Overview; 2) Background; 3) Principles of Operation; 4) Advantages Over Confocal; 5) Modes of Operation; and 6) Applications.
CASI
Fluorescence; Microscopy; Photons; Research; Bioinstrumentation; Medical Science

20070022630 Toyama Univ., Toyama, Japan
Effects of Hypergravity Stimulus on Primary Xylem Development and Mechanical Properties of Secondary Cell Walls in Inflorescence Stems of Arabidopsis Thaliana L.
Nakabayashi, Izumi; Karahara, Ichirou; Tamaoki, Daisuke; Masuda, Kyojiro; Soga, Kouichi; Hoson, Takayuki; Kamisaka, Seiichiro; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-121 - P-122; In English; See also 20070022623; Copyright; Avail.: Other Sources

The effects of hypergravity stimulus on morphology and development of primary xylem vessels and on mechanical properties of isolated secondary wall preparations were examined in inflorescence stems of Arabidopsis, which have been grown for 3 to 5 days after exposing to hypergravity at 300 x g for 24 h. Number of metaxylem elements per xylem, apparent thickness of the secondary thickenings, and cross-section area of metaxylem elements in inflorescence stems increased in response to hypergravity. Extensibility of secondary cell wall preparation, which was isolated from inflorescence stems by enzyme digestion of primary cell wall components, decreased in response to hypergravity.
Author
Cells (Biology); High Gravity Environments; Plants (Botany); Cell Membranes (Biology); Cytology; Gravitational Effects

20070022634 National Academy of Science of the Ukraine, Kiev, Ukraine
The State of the Antioxidative System in Pea Plants under Clinorotation
Baranenko, Valentyna V.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-111 - P-112; In English; See also 20070022623; Copyright; Avail.: Other Sources

Total antioxidant activity (AOA) and the activity of superoxide dismutase (SOD) were studied in pea leaves and roots under 7- and 14day clinorotation (2 rpm/min). The adaptive increase of total AOA and SOD activity in both the leaves and

roots was noted under 7-day clinorotation. The higher increase of antioxidant activity in leaves in comparison with roots indicates that chloroplasts are the source of the reactive oxygen species (ROS) in plant cells. Under the 14-day clinorotation the SOD activity and total AOA in pea plants were higher than in control ones, but this increase was lower than ROS production and intensification of lipid peroxidation in these conditions. Such, the balance between reactive oxygen species production and their removal was breakage into the increase of ROS production under 14-day clinorotation.
Author
Antioxidants; Clinorotation; Oxygen; Plants (Botany)

20070022640 National Academy of Science of the Ukraine, Kiev, Ukraine
Altered Gravity Effect on the Heat-Shock Protein Level in Plants
Kozeko, L. Ye.; Kordyum, E. L.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-117 - P-118; In English; See also 20070022623; Copyright; Avail.: Other Sources

Significant environmental deviations often cause activation of synthesis of heat shock proteins (HSPs). We supposed a participation of HSPs in plant adaptation to altered gravity. In this work, we tested whether clinorotation causes an activation of HSP90 and HSP70 synthesis. 3-day old pea seedlings were subjected to short (2-10 h) clinorotation (2 rpm). The increased HSP70 and HSP90 levels in response to clinorotation were determined by Western-blot analysis. Such increasing was more significant for HSP70 than for HSP9O. The obtained data testify upregulation of the stress proteins HSP90 and HSP70 in pea seedlings under clinorotation.
Author
Clinorotation; Gravitational Effects; Proteins; Thermal Shock; Seedlings (Botany)

20070022691 Paris Univ., France
Sea Urchin Development Test in the BIOLAB Flight Model
Marthy, Hans-Juerg; Brinckmann, Enno; Labreuille, Bertrand; Pefferkorn, Alexandre; Eche, Brigitte; Gasset, Gilbert; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-169-P-170; In English; See also 20070022623; Copyright; Avail.: Other Sources

BIOLAB is ESA's biological research facility in the Columbus Model on the International Space Station (ISS); it is designed for experiments with cell cultures, small plants and small animals. The biocompatibility of the Life Support System and the Analysis Instrument was tested in the Flight Model with sea urchin larvae, developing from the blastula stage to the early pluteus larva. Earlier tests proved the high sensitivity of this biological system which reacts immediately with impaired development when exposed to toxic environmental parameters: several materials had to be rejected and were replaced in BIOLAB due to their bio-toxic effects on the sea urchin larva development. The test proved that BIOLAB is an excellent research platform for experiments in developmental biology, allowing also automated operational steps for the experiment performance and the analysis.
Author
Research Facilities; Sea Urchins; Space Laboratories; Spaceborne Experiments; Ontogeny

20070022710 National Academy of Science of the Ukraine, Kiev, Ukraine
Expression Messenger RNA of Two Cytosolic Small Heat Shock Proteins under Clinorotation
Oleksandr, Talalaiev; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-115 - P-116; In English; See also 20070022623; Copyright; Avail.: Other Sources

During their life cycle, plants are subjected to dissimilar environmental conditions, which are often not favourable. To protect themselves against these adverse situations, plant cells synthesize several classes of small heat shock proteins ranging in size from 15 to 30 kDa. This proteins are able to enhance the refolding of chemically denatured proteins in an ATP-independent manner, in other words they can function as molecular chaperones. The object of our study is evaluation of the stress gene expression in etiolated Pisum sativum seedlings exposed to altered gravity and heat shock. We investigate two inducible forms of the cytosolic small heat shock protein (sHsp), sHsp 17.7 and sHsp 18.1. Applying the RT-PCR we explore sHsps mRNA expression in pea cells, subjected to slow horizontal clinorotation (2 rpm), and temperature elevation (42OC). Temperature elevation, as positive control, significantly increased PsHspl7.7, PsHspl8.1 mRNA expression. Expression of the housekeeping gene, actin 2 was constant and comparable to unstressed controls for all treatments. We supposed that gravitational perturbations probable alters stress genes expression.
Author
Clinorotation; Genes; Ribonucleic Acids; Thermal Shock; Proteins

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*.

20070022282 Institute of Space Medico-Engineering, Beijing, China
Space Medicine and Medical Engineering, Vol. 20 No. 1
February 2007; ISSN 1002-0837; 84 pp.; In Chinese; See also 20070022283 - 20070022299; Copyright; Avail.: Other Sources

Topics discussed include: A Scoring Method for Quantitative Assessment of Cardiovascular Health Status Based on Non-linear Parameters; Study on Homogeneous Head Phantoms Based on Electrical Impedance Tomography; Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment; Realization of Anisotropic Bone Remodelling Process; Whole Body Simulation and Visualization of Metabolic Process of 18F 2-fluoro-2-deoxy-D-glucose; Spectral Analysis of Pulse Transit Time Variability; Non-rigid Medical Image Registration Based on the Thin-plate Spline and Shape Context; Design and Implementation of A Portable ECG Monitor for Multi-user; Development of an Improved Ground-based Prototype of Space Plant-growing Facility; Influence of Fluid Shear Stress on Expression of Cbfal in MG-63 Cells Cultured under Simulated Microgravity Condition; Preliminary Research on Effects of Percutaneous Muscular Electrical Stimulation against Bone Loss in Tail-suspended Rats; Oligonucleotide Hybridization Detection Based on Surface Plasmon Resonance Technology; Design and Implement of the ECLSS Adaptive Learning Intelligent Decision Support System; A Study of Pointing Movement Characteristics and Ergonomics on Front Board; Study on Range of Motion of Manual Performance for Ergonomics Evaluation; Early Face Processing of Internet Addiction Patients by Face-specific N170; and Research Advancement of Superhydrophilic Thin Film in Condensation Heat Regenerators.
Derived from text
Cardiovascular System; Electrocardiography; Life Support Systems; Bone Demineralization; Decision Support Systems; Imaging Techniques

20070022283 Institute of Space Medico-Engineering, Beijing, China
Realization of Anisotropic Bone Remodelling Process
MA, Zong-min; LI, Shu-xian; ZHU, Xing-hua; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 28-31; In Chinese; See also 20070022282; Copyright; Avail.: Other Sources

Objective: To develop a new theoretical model of bone remodelling to simulate and to realize the anisotropic bone remodelling process. Methods: A new theoretical model of anisotropic bone remodelling was put forward on the basis of Wolff's law and anisotropic mechanical properties of bone after the current isotropic bone structure remodelling technology was studied in detail. The new model regarded an inclination for material orientation to be consistent with principal stress orientation as bone remodelling balance condition. The model was then applied to study the two-dimension simple supported beam. Results: Simulation results of the two-dimension simple supported beam, density distributing figure and trace figure of principal stress orientation were obtained. In comparison with the simulation result of the isotropic model, the simulation result of the new model is more reasonable. Conclusion: The new model quantitates the anisotropy of bone remodelling process and bone mechanical properties and then realizes the anisotropy of bone remodelling process. The model can be applied to even more exact bone structure forecast.
Author
Anisotropy; Bones; Mathematical Models; Mechanical Properties

20070022284 BeiHang Univ., Beijing, China
A Study of Pointing Movement Characteristics and Ergonomics on Front Board
Du, Jun-min; YUAN, Xiu-gan; SHI, Hai-wen; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 62-67; In Chinese; See also 20070022282; Copyright; Avail.: Other Sources

Objective: To study pointing movement characteristics and ergonomics when human upper limb touches different targets on the front board. Methods: An experiment was designed, in which the data of motion duration, peak velocity, trajectory length and peak power at shoulder and elbow joint were collected. Results: By analysis of the experimental results, the pointing movement characteristics among the different regions on the front board were disclosed preliminarily. Conclusion:

When a right-handed person touches a target on the front board, the pointing movement ergonomics on left-upper region is the best, while that on right-lower region is the worst.
Author
Human Factors Engineering; Shoulders; Trajectories

20070022285 Institute of Space Medico-Engineering, Beijing, China
Study on Homogeneous Head Phantoms Based on Electrical Impedance Tomography
WANG, Cong; DONG, Xiu-zhen; SHI, Xue-tao; SHUAI, Wan-jun; Yang, Run-nan; YOU, Fu-sheng; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 19-23; In Chinese; See also 20070022282; Copyright; Avail.: Other Sources

Methods: Based on an optimized hardware system and back-projection algorithm, data of various configurations of perturbations were collected from both a cylindrical and a hemispherical head phantom were constructed. Results: Images were reconstructed successfully with current system for perturbations of different conductivities ,sizes or positions in the homogeneous head phantoms. Conclusion: Significant influences on image quality are found with the presence of the 'skull'. The feasibility of electrical impedance monitoring of human brain is suggested and the possibility of the experiment on animals is proved.
Author
Image Resolution; Tomography; Brain; Conductivity; Electrical Impedance

20070022286 Xuzhou Normal Univ., Xuzhou, China
Early Face Processing of Internet Addiction Patients by Face-specific N170
ZHAO, Lun; GAO, Wen-bin; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 72-74; In Chinese; See also 20070022282; Copyright; Avail.: Other Sources

:Objective: To study early face processing of internet addiction patients by using ERP method. Methods: Ten healthy young man 18-21 years and 10 internet addiction patients 17 - 22 years served as subjects in experiment. Two runs of 300 stimuli (duration: 50 ms) of 3 facial and 3 nonfacial pictures were randomly presented with equal probability (IS1 : from 1 000 ms to 1 500 ms randomly), and the subjects were asked to react to facial stimuli and non-facial stimuli by pressing the left button and right button respectively as quickly as possible. Thirty two channel electroencephalogram (EEG) was recorded by Neuroscan Nuamps System. Results 1) Specific-face component Nd170 (face N170 minus object N170) was found in both groups, which was distributed at the temporal-occipital region in control groups but at occipital region in internet addiction group; 2) Compared with Nd170 in internet addiction group, Nd170 was significantly lower at occipital region and delayed in control group. Conclusion The early face processing mechanism of internet addiction patients may be different from normal people.
Author
Electroencephalography; Patients; Internets

20070022287 Shanghai University of Electric Power, Shanghai, China
Non-rigid Medical Image Registration Based on the Thin-plate Spline and Shape Context
Yue-e WU; Xiao-xi Wang; Zhang HA; LI Chuan-fu; ZHOU Ping; ZHOU Kang-yuan; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 43-46; In Chinese; See also 20070022282; Copyright; Avail.: Other Sources

To present situation of medical image non-rigid registration, based on point-sets. A new method to measure the similarity-the shape context was attached to solve the correspondences between points on the two shapes; and the correspondence was used to estimate the non-rigid transform function. The thin-plate spline was used to realize fast and exact non-rigid registration of medical image. The experimental results show that this method can achieves better matching effect.
Author
Image Processing; Shapes; Splines; Thin Plates; Aerospace Medicine

20070022288 Institute of Space Medico-Engineering, Beijing, China
Study on Range of Motion of Manual Performance for Ergonomics Evaluation
CHEN, Shou-ping; ZHANG, Lin; DING, Li; YANG, Feng; YANG, Chun-xin; YUAN, Xiu-gan; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 68-71; In Chinese; See also 20070022282; Copyright; Avail.: Other Sources

Objective: To search for perfect and logical evaluation indexes of range of motion of manual performance and maximal

voluntary range of motion. Methods: From mechanism of hand movement and characteristics of manual action, some relative comprehensive evaluation indexes on range of motion of manual performance were provided. Twenty six undergraduates (14 male and 12 female) participated in the test for 16 indexes. Results: The maximal voluntary range of motion of thumb,four fingers and wrist were obtained. Conclusion: The results can provide foundation for ergonomics design of spacesuit gloves. Author

Performance Tests; Human Factors Engineering; Space Suits; Gloves; Fingers

20070022289 Institute of Space Medico-Engineering, Beijing, China

Oligonucleotide Hybridization Detection Based on Surface Plasmon Resonance Technology

LIU, Xue-yong; BAI, Yan-qiang; WANG, Chun-yan; DAI, Zhong-quan; LI, Ying-hui; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 16-18; In Chinese; See also 20070022282; Copyright; Avail.: Other Sources

Objective: To establish a kind of detection technique of nucleic acid based on surface plasmon resonance(SPR) and to set up the foundation of real-time, online space microbial detection. Methods: A portable online bio-molecules analyzer based on SPR biosensor was applied. The probe was mercapto-modified at the 5' end and immobilized on the sensor surface. Then the target sequences in the solution were monitored and sensitivity, specificity and reproducibility of the method were investigated. Results: The results showed that detection method with good specificity and sensitivity could realize online detection of target sequence. The system could detect 2.3 nmol/L target sequence, CV value of nine detections was 3.5 % and that of thirty detections was 14.7 % . Conclusion: The established nucleic acid detection method has the advantage of high sensitivity, good specificity and reproducibility, which can be applied in the field of nucleic acid detection. Author

Surface Plasmon Resonance; Oligonucleotides; Nucleic Acids; Detection; Bioinstrumentation

20070022290 China Astronaut Research and Training Center, Beijing, China

Development of an Improved Ground-based Prototype of Space Plant-growing Facility

GUO, Shuang-sheng; LIU, Xiang-yang; AI, Wei-dang; ZHU, Jing-tao; WANG, Xiao-xia; WEI, Min; YANG, Yong; QIN, Li-feng; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 51-56; In Chinese; See also 20070022282; Copyright; Avail.: Other Sources

Objective: To develop an improved prototype making its operating principle adapt to the space microgravity enviroment better, based on the ground-based prototype of a space plant-growing facility, Methods: With the experience of the development of a first-generation prototype of the space plant-growing facility and detailed demonstration and design of technique plan, its blueprint design and machining of related components, whole facility installation, debugging and trial operations were done. Results: The atmospheric environmental parameters in the growing chamber and water content in the growing media were totally and effectively controlled; the operating principles of temperature and humidity control, collection of cooled water and supply of plant nutrient can meet nearly the requirements of space microgravity environment. Conclusion The entire systematic design of the facility is reasonable and the key techniques relating to plant growing in space are nearly solved, which lays an important foundation for future development of the space plant-growing facility to be tested and applied in space. Author

Microgravity; Aerospace Environments; Operating Temperature; Atmospheric Temperature; Humidity; Moisture Content

20070022291 Institute of Space Medico-Engineering, Beijing, China

Design and Implementation of A Portable ECG Monitor for Multi-user

QI, Lin; BAI, Jing; ZHANG, Yong-hong; LIU, Chen-guang; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 47-50; In Chinese; See also 20070022282; Copyright; Avail.: Other Sources

Objective: To design and implement a portable electrocardiogram (ECG) monitor for multiple users. Methods: Multilevel menu on liquid crystal displayer (LCD) for switching among users based on digital signal processor(DSP) was developed. Record header in ECG records for different users was appended, and communication protocol between monitor and hospital center was made. Results: This monitor could record three users' ECG signal and transmit the ECG records to remote hospital center via digital communication method. The hospital center could receive and file the ECG records of different users. Conclusion: This monitor can be used for three users and is more efficient in the application of ECG monitoring. Author

Electrocardiography; Pulse Communication; Switching; Liquid Crystals

20070022292 Institute of Space Medico-Engineering, Beijing, China

Preliminary Research on Effects of Percutaneous Muscular Electrical Stimulation against Bone Loss in Tail-suspended Rats

PENG, liang; SHANG, Yu; LIANG, Ying; SUN, Bo-yuan; WANG, Guang-zhi; BAI, Jing; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 7-10; In Chinese; See also 20070022282; Copyright; Avail.: Other Sources

Objective To further evaluate the effects of percutaneous muscular electrical stimulation (PMES) against bone loss in tail-suspended rats. Methods Seventeen male SD rats were randomly divided into free control (Con) group (n = 4) , tail-suspended (TS) group (n = 7) , and tailsuspended and PMES (TS + PMES) group (n =6). The experiment lasted for 26 d with PMES 1 h/ d. The right gluteus medius muscle was stimulated by an electrical current with 50 Hz and 3 mA. Bone mineral density (BMD) of the proximal, middle and distal portions of femurs in all the rats were measured after experiment. Results For BMD of the proximal portion of right femurs, there were no significant differences among the three groups. For BMD of the middle portion of right femurs, there were significant differences between the Con group and the other groups ($P < 0.05$), while no significant difference between the other two groups. For the BMD of the distal portion of right femurs, there were extremely significant differences between TS group and the other groups ($P < 0.01$), while no significant difference between the other two groups. Conclusion Bone loss in tail-suspended rats occurs in the middle and distal portions of the femur, and PMES as a countermeasure against osteoporosis can keep BMD of the distal portion of the femur at a normal level. Author

Bone Demineralization; Muscles; Rats; Bone Mineral Content; Osteoporosis

20070022293 Institute of Space Medico-Engineering, Beijing, China

Influence of Fluid Shear Stress on Expression of Cbf(alpha)1 in MG-63 Cells Cultured under Simulated Microgravity Condition

YANG, Zhi; WANG, Bing; SUN, Xi-qing; ZHANG, Shu; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 11-15; In Chinese; See also 20070022282; Copyright; Avail.: Other Sources

Objective: To clarify the effect of flow shear stress (FSS) on the expression of core binding factor alpha1 (Cbf(alpha)1) in human osteosarcoma MG-63 cells cultured in simulated microgravity environments and the mechanism of osteopenia induced by weightlessness. Methods: MG-63 cells were divided into two groups (1 G group and simulated microgravity group) after cultured for 24 h. One group of cells were rotated 48 h to simulate weightlessness environment while the other group of cells were kept at 1 G as control. Then the cells were treated with 0.5 Pa FSS in a flow chamber for 15, 30, 60 min, respectively. Total RNA in the cells was isolated. RT-PCR analysis were made to examine the gene expression of Cbf(alpha)1. Each value was normalized against that of glyceraldehydes phosphate dehydrogenase (GAPDH) . Moreover, the protein expression of Cbfal was detected by Western blotting. Results Compared with control group, Cbf(alpha)1 expression increased remarkably from 30 min to 60 min with the treatment of FSS ($P < 0.01$). Compared with 1 G group, the expression of Cbfal was down-regulated in simulated microgravity group. The differences were significant at 30 and 60 min. Conclusion FSS can significantly increase the expression of Cbf(alpha)1 in MG-63 cells. The inducing effect of FSS on the expression of Cbf(alpha)1 is affected by the simulated microgravity environment.

Author

Shear Stress; Flow Chambers; Microgravity; Gene Expression; Ribonucleic Acids

20070022294 Institute of Space Medico-Engineering, Beijing, China

Whole Body Simulation and Visualization of Metabolic Process of 18F 2-fluoro-2-deoxy-D-glucose

Yun-feng CUI; BAI Jing; CHEN Ying-mao; TIAN Jia-he; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 32-36; In English; See also 20070022282; Copyright; Avail.: Other Sources

To simulate the metabolic distribution process of F-18 2-fluoro-2-deoxy-D- glucose (FDG) in human body and to visualize this distribution process through 30 images with high resolution and high quality. The model parameters of FDG metabolism in tissues were estimated through clinical experiments, and the curves which represent the FDG metabolic process in tissues were calculated using the model parameters and blood input function. This FDG distribution process in human body was visualized basing on the high-resolution anatomical structure. The simulation and visualization results directly and clearly displayed the FDG metabolic distribution process after injection to human body. The properties of the FDG distribution process represented by our simulation were consistent with that represented by clinical experiment. The method presented in this study is effective to simulate and visualize human functional information of metabolism, and it may provide a useful tool for education and research on nuclear imaging.

Author

Fluoro Compounds; Glucose; Human Body; Metabolism; Simulation; Visual Perception

20070022295 Capital Medical Univ., Beijing, China

A Scoring Method for Quantitative Assessment of Cardiovascular Health Status Based on Non-linear Parameters

LI, Xia; Bai, Jing; Rein, Zhi-ying; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 1-6; In Chinese; See also 20070022282

Contract(s)/Grant(s): NSF 3021002; Copyright; Avail.: Other Sources

To study a scoring method for assessing function status of cardiovascular system quantitatively. First, exercise heart rate variability (EHRV) was obtained from the primary dynamic electrocardiogram (ECG) recorded during exercise testing. Then appropriate entropy, relative complexity, and other three parameters extracted from poincare dispersed-dot plot were extracted from the EHRV. Discriminant analysis was used to classify two extreme groups. Based on the values of two groups from the discriminant formula, a scoring formula was proposed and four ranks were divided according to different score domains. A novel scoring method was established. To validate the proposed scoring method, 60 middle-aged hypertensives, 50 elder subjects and 110 young healthy subjects were examined and scored. Scores of 220 subjects are consistent with their real health status. The proposed scoring method reflects the status of the subject's cardiovascular system effectively.

Author

Cardiovascular System; Electrocardiography; Health; Nonlinearity

20070022297 Institute of Space Medico-Engineering, Beijing, China

Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment

SHI, Xue-tao; HUO, Xu-yang; YOU, Fu-sheng; FU, Feng; LIU, Rui-gang; XU, Can-hua; DONG, Xiu-zhen; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 24-27; In Chinese; See also 20070022282; Copyright; Avail.: Other Sources

Objective: To study the feasibility of electrical impedance imaging technique used as an early diagnosing device for continuous or delayed intracranial hemorrhage. Methods: An electrical impedance tomography system working at (1 to approx. 190) kHz was developed. The measuring precision is better than 0.04% and the imaging speed is faster than 1.25 frames/s. Experiments were done by using this system, in 8 piglets of (10.00 +/- 0.76) kg. intracranial injection of 2 ml anticoagulant blood was given to each animal to observe the imaging results. After that, intracranial injection of 2 ml 0.9% saline solutions was given to 4 pigs, and intracranial injection of 2 ml distilled water was given to the other 4 pigs. Results: Resistivity in the target area decreased after injection of saline, but increased after injection of the distilled water. For the blood injections, the resistivity increased in 3 pigs as the blood was proved to be injected into the lateral ventricle, and decreased in 3 out of the other 4 pigs after the injection. It was considered as no effect in the 2 remainders. Conclusion: Electrical impedance imaging technique can be used as a method of early diagnosis of continuous or delayed intracranial hemorrhage.

Author

Electrical Impedance; Hemorrhages; Imaging Techniques; Cranium; Electrical Resistivity; Anticoagulants

20070022299 Institute of Space Medico-Engineering, Beijing, China

Spectral Analysis of Pulse Transit Time Variability

Du, Juan; Ning, Gang-min; Zhang, Shao-wen; Bai,Yan; Zheng, Xiao-xiang; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 37-42; In Chinese; See also 20070022282; Copyright; Avail.: Other Sources

To analyse pulse transit time variability (PTTV) in frequency domain and to study the physiological interpretation of PTTV. Pulse transit time (PTT) was obtained by ECG and PPG (photoplethysmography) from 187 subjects. Spectrum of PTTV was estimated using auto-regressive (AR) model. The peaks and troughs in PTTV spectrum were clustered to get the frequency segment method to extract characteristic parameters such as the power in the specific frequency segment. Subjects were divided into 3 groups as normotensive, prehypertensive and hypertensive. Parameters of each subject in the 3 groups were computed and compared. Spectra of PTTV and HRV were also compared. Apparent frequency components were found in the spectrum of PTTV. The spectrum can be segmented into 5 components, and feature parameters were extracted from them. PTTV spectrum of prehypertensive was shifted to lower frequency. Spectra of PTTV and heart rate variability (HRV) are similar to some extent. However, spectral parameters of PTTV show significant difference between prehypertensive and hypertensive groups, which was not recognized by HRV parameters. This paper proposed a new spectral analysis method for PTTV analysis. PTTV may reflect the modulation function of autonomic nervous system, and it is more sensitive than HRV in indicating the development of hypertension. Further development of PTTV analysis and investigation of its physiological role may provide a promising approach for clinical study.

Author

Spectrum Analysis; Variability; Time Dependence; Physiology; Hypertension; Heart Rate

20070022323 NASA Johnson Space Center, Houston, TX, USA, Wyle Labs., Inc., Houston, TX, USA

Diagnostic Imaging in the Medical Support of the Future Missions to the Moon

Sargsyan, Ashot E.; Jones, Jeffrey A.; Hamilton, Douglas R.; Dulchavsky, Scott A.; Duncan, J. Michael; May 13, 2007; 35 pp.; In English; 79th Annual Scientific Meeting of the Aerospace Medical Association, 13-17 May 2007, New Orleans, LA, USA; Original contains color illustrations

Contract(s)/Grant(s): NAS9-02078; Copyright; Avail.: CASI: A03, Hardcopy

This viewgraph presentation is a course that reviews the diagnostic imaging techniques available for medical support on the future moon missions. The educational objectives of the course are to: 1) Update the audience on the curreultrasound imaging in space flight; 2) Discuss the unique aspects of conducting ultrasound imaging on ISS, interplanetary transit, ultrasound imaging on ISS, interplanetary transit, and lunar surface operations; and 3) Review preliminary data obtained in simulations of medical imaging in lunar surface operations.

CASI

Imaging Techniques; Ultrasonics; Lunar Exploration; Telemedicine; Aerospace Medicine; Medical Services

20070022326 NASA Johnson Space Center, Houston, TX, USA

Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest

Muir, J. W.; Xia, Y.; Holquin, N.; Judex, S.; Qin, Y.; Evans, H.; Lang, T.; Rubin, C.; [2007]; 2 pp.; In English; American Society for Bone and Mineral Research Meeting, 16-19 Sep. 2007, Honolulu, HI, USA

Contract(s)/Grant(s): NRA-03-OBRP-06

Report No.(s): 07-A-1976-ASBMR; Copyright; Avail.: Other Sources; Abstract Only

Long duration spaceflight leads to multiple deleterious changes to the musculoskeletal system, where loss of bone density, an order of magnitude more severe than that which follows the menopause, combined with increased instability, conspire to elevate the risk of bone fracture due to falls on return to gravitational fields. Here, a ground-based analog for spaceflight is used to evaluate the efficacy of a low-magnitude mechanical intervention, VIBE (Vibrational Inhibition of Bone Erosion), as a potential countermeasure to preserve musculoskeletal integrity in the face of disuse. Twenty-six subjects consented to ninety days of six-degree head-down tilt bed-rest. 18 completed the 90d protocol, 8 of which received daily 10-minute exposure to 30 Hz, 0.3g VIBE, applied in the supine position using a vest elastically coupled to the vibrating platform. The shoulder harness induced a load of 60% of the subjects body weight. At baseline and 90d, Qualitative Ultrasound Scans (QUS) of the calcaneus and CT-scans of the hip and spine were performed to measure changes in bone density. Postural control (PC) was assessed through center of pressure (COP) recordings while subjects stood on a force platform for 4 minutes of quiet stance with eyes closed, and again with eyes opened. As compared to control bedrest subjects,

Author

Musculoskeletal System; Physiological Responses; Ultrasonics; Bed Rest; Supine Position; Body Weight

20070022350 NASA Johnson Space Center, Houston, TX, USA

The Effect of Increasing Mass upon Locomotion

DeWitt, John; Hagan, Donald; June 11, 2007; 54 pp.; In English; Original contains color illustrations; Copyright; Avail.: CASI: A04, Hardcopy

The purpose of this investigation was to determine if increasing body mass while maintaining bodyweight would affect ground reaction forces and joint kinetics during walking and running. It was hypothesized that performing gait with increased mass while maintaining body weight would result in greater ground reaction forces, and would affect the net joint torques and work at the ankle, knee and hip when compared to gait with normal mass and bodyweight. Vertical ground reaction force was measured for ten subjects (5M/5F) during walking (1.34 m/s) and running (3.13 m/s) on a treadmill. Subjects completed one minute of locomotion at normal mass and bodyweight and at four added mass (AM) conditions (10%, 20%, 30% and 40% of body mass) in random order. Three-dimensional joint position data were collected via videography. Walking and running were analyzed separately. The addition of mass resulted in several effects. Peak impact forces and loading rates increased during walking, but decreased during running. Peak propulsive forces decreased during walking and did not change during running. Stride time increased and hip extensor angular impulse and positive work increased as mass was added for both styles of locomotion. Work increased at a greater rate during running than walking. The adaptations to additional mass that occur during walking are different than during running. Increasing mass during exercise in microgravity may be beneficial to increasing ground reaction forces during walking and strengthening hip musculature during both walking and running. Future study in true microgravity is required to determine if the adaptations found would be similar in a weightless environment.

Author

Locomotion; Impact Loads; Body Weight; Reaction Kinetics; Gait; Physical Exercise

20070022435 NASA Johnson Space Center, Houston, TX, USA, Wyle Labs., Inc., Houston, TX, USA
Determination of Scopolamine in Human Saliva Using Solid Phase Extraction and LC/MS/MS
Wang, Zuwei; Vaksman, Zalman; Boyd, Jason; Putcha, Lakshmi; [2007]; 1 pp.; In English; 2007 AAPS Annual Meeting and Exposition, 11-15 November 2007, San Diego, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

Purpose: Scopolamine is the preferred treatment for motion sickness during space flight because of its quick onset of action, short half-life and favorable side-effect profile. The dose administered depends on the mode of administration and usually ranges between 0.1 and 0.8 mg. Such small doses make it difficult to detect concentrations of scopolamine in biological fluids by using conventional HPLC methods. To measure scopolamine in saliva and thereby to evaluate the pharmacokinetics of scopolamine, we developed an LC/MS/MS method using off-line solid phase extraction. Method: Samples (0.5mL) were loaded onto Waters Oasis HLB co-polymer cartridges (10 mg, 1 mL) and eluted with 0.5 mL methanol without evaporation and reconstitution. HPLC separation of the eluted sample was performed using an Agilent Zorbax SB-CN column (50 x 2.1 mm) at a flow rate of 0.2 mL/min for 4 minutes. The mobile phase for separation was 90:10 (v/v) methanol: ammonium acetate (2 mM) in water, pH 5.0 +/- 0.1. Concentrations of scopolamine were determined using a Micromass Quattro Micro(TM) mass spectrometer with electrospray ionization (ESI). ESI mass spectra were acquired in positive ion mode with multiple reaction monitoring for the determination of scopolamine m/z = 304.2 yields 138.1 and internal standard (IS) hyoscyamine m/z = 290.2 yields 124.1. Results: The method is rapid, reproducible, specific and has the following parameters: scopolamine and the IS are eluted at 1.7 and 3.2 min respectively. The linear range is 50-5000 pg/mL for scopolamine in saliva with correlation coefficients > 0.99 with a CV < 0.5 %. The intra-day and inter-day CVs are < 15 % for quality control samples with concentrations of 75, 300, 750 and 3000 pg/mL of scopolamine in human saliva. Conclusion: Solid phase extraction allows more rapid sample preparation and greater precision than liquid extraction. Furthermore, we increased the sensitivity and specificity by adjusting the LC mobile phase and using an MS/MS detector.
Author
Extraction; Hyoscine; Pharmacology; Saliva; Bioavailability; Motion Sickness Drugs

20070022493 NASA Johnson Space Center, Houston, TX, USA
Use of Thermoregulatory Models to Enhance Space Shuttle and Space Station operations and Review of Human Thermoregulatory Control
Pisacane, V. L.; Kuznetz, L. H.; Logan, J. S.; Clark, J. B.; Wissler, E. H.; [2007]; 17 pp.; In English; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

Thermoregulation in the space environment is critical for survival, especially in off- nominal operations. In such cases, mathematical models of thermoregulation are frequently employed to evaluate safety-of-flight issues in various human mission scenarious. In this study, the 225-node Wissler model and the 41-Node Metabolic Man model are employed to evaluate the effects of such a scenario. Metabolic loads on astronauts wearing the advanced crew escape suit (ACES) and liquid cooled ventilation garment (LCVG) are imposed on astronauts exposed to elevated cabin temperatures resulting from a systems failure. The study indicates that the performance of the ACES/LCVG cooling system is marginal. Increases in workload and or cabin temperature above nominal will increase rectal temperature, stored heat load, heart rate, and sweating, which could lead to deficits in the performance of cognitive and motor tasks. This is of concern as the ACES/LCVG is employed during Shuttle decent when the likelihood of a safe landing may be compromised. The study indicates that the most effective mitigation strategy would be to decrease the LCVG inlet temperature.
Author
Space Shuttles; Thermoregulation; International Space Station; Mathematical Models; Aerospace Medicine; Manned Space Flight

20070022570 NASA Johnson Space Center, Houston, TX, USA
Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis
Hada, M.; Saganti, P. B.; Gersey, B.; Wilkins, R.; Cucinotta, F. A.; Wu, H.; June 10, 2007; 1 pp.; In English; 8th LANSCE User Group Meeting, 10-12 June 2007, Los Alamos, NM, USA; Copyright; Avail.: Other Sources; Abstract Only

High-energy secondary neutrons, produced by the interaction of galactic cosmic rays (GCR) with the atmosphere, spacecraft structure and planetary surfaces, contribute a significant fraction to the dose equivalent radiation measurement in crew members and passengers of commercial aviation travel as well as astronauts in space missions. The Los Alamos Nuclear Science Center (LANSCE) neutron facility's 30L beam line (4FP30L-A/ICE House) is known to generate neutrons that simulate the secondary neutron spectrum of the Earth's atmosphere at high altitude. The neutron spectrum is also similar to that measured onboard spacecrafts like the MIR and the International Space Station (ISS). To evaluate the biological damage,

we exposed human epithelial cells in vitro to the LANSCE neutron beams with an entrance dose rate of 2.5 cGy/hr, and studied the induction of chromosome aberrations that were identified with multicolor-banding in situ hybridization (mBAND) technique. With this technique, individually painted chromosomal bands on one chromosome allowed the identification of inter-chromosomal aberrations (translocation to unpainted chromosomes) and intra-chromosomal aberrations (inversions and deletions within a single painted chromosome). Compared to our previous results with gamma-rays and 600 MeV/nucleon Fe ions of high dose rate at NSRL (NASA Space Radiation Laboratory at Brookhaven National Laboratory), the neutron data from the LANSCE experiments showed significantly higher frequency of chromosome aberrations. However, detailed analysis of the inversion type revealed that all of the three radiation types in the study induced a low incidence of simple inversions. Most of the inversions in gamma-ray irradiated samples were accompanied by other types of intrachromosomal aberrations but few inversions were accompanied by interchromosomal aberrations. In contrast, neutrons and Fe ions induced a significant fraction of inversions that involved complex rearrangements of both inter- and intrachromosome exchanges. The distribution of damage sites on chromosome 3 was also compared for different radiation types. The breakpoints were randomly localized on chromosome 3 with neutrons and Fe ions exposure, whereas non-random distribution with clustering breakpoints was observed with gamma-rays exposure. The specific fingerprint of neutron radiations on chromosomal aberrations will be discussed.

Author

Chromosome Aberrations; Chromosomes; Extraterrestrial Radiation; Galactic Cosmic Rays; Gamma Rays; Neutron Beams; Epithelium; Radiation Dosage

20070022623 International Society for Gravitational Physiology, Washington, DC, USA

Journal of Gravitational Physiology, Volume 13, No. 1

Fuller, Charles A., Editor; Cogoli, Augusto, Editor; Hargens, Alan R., Editor; Smith, Arthur H., Editor; July 2006; ISSN 1077-9248; 237 pp.; In English; 27th Annual Gravitational Physiology Meeting, 23-28 Apr. 2007, Osaka, Japan; See also 20070022624 - 20070022716; Original contains black and white illustrations

Contract(s)/Grant(s): NNA06CA96G; Copyright; Avail.: Other Sources

At the outset, the Journal published one issue in 1994. The first number comprised the Proceedings of the 15th Annual International Gravitational Physiology Meeting, held in Barcelona, Spain in October 1993. The Proceedings of the previous 14 Annual Meetings appeared as supplements to The Physiologist from 1979 to 1993. Each year, one issue of the Journal is devoted to the Annual Meeting Proceedings, and up to four more issues are comprised of full-length research papers. Additionally, Supplement Issues are considered by the Editorial Board as they are submitted. The Journal is published for the International Society for Gravitational Physiology by the Galileo Foundation, a 501(c)(3) nonprofit public benefit corporation. This issue, the first number of 2006, comprises the Proceedings of the joint meeting of the International Society for Gravitational Physiology s 27th Annual International Gravitational Physiology Meeting, held in Osaka, Japan 23- 28 April, 2006. The Journal of Gravitational Physiology invites the submission of original experimental or observational papers on subjects in the field of gravitational physiology. Review articles, theoretical papers and historical or biographical articles will also be solicited by the Editor for publication. The wide scientific span of the Journal rests on physiology as its keystone. Gravitational physiology is considered to include the effects of changes in the magnitude and directions of the gravitational force environment on cells and physiological systems and behavior of humans, animals and plants. The effects of weightlessness during space flight, high sustained G forces and chronic acceleration, vibration, impact and the various forms of simulated weightlessness are also included, as well as is consideration of the evolutionary consequences of gravity and the role of gravity in the manifestation of scale effects in animals and plants.

Derived from text

Gravitational Physiology; Microgravity; Conferences; Aerospace Medicine; Manned Space Flight

20070022625 Military Institute of Aviation Medicine, Warszawa, Poland

Push-Pull Centrifuge Training for the Polish Pilots: Two Years' Experience

Mikuliszyn, R.; Tarnowski, A.; Biernacki, M.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-173 - P-174; In English; See also 20070022623; Original contains black and white illustrations; Copyright; Avail.: Other Sources

Aim of the study was to determine if push-pull phenomenon could be of any value for centrifuge training. 12 pilots took part in the training. Trainees were subjected to acceleration within 0 Gz and +1 Gz range (relative negative Gz [r-Gz]). Maximal HR reached greater values after each consecutive r-Gz exposure (p less than 0.001). Time to reach maximal HR values after each r-Gz exposure showed a shortening tendency (p less than 0.007). Diastolic pressure (dBP) during each r-Gz phase was always greater then baseline values (p less than 0.00l). Minimal dBP, sBP and MAP values showed a diminishing

tendency after each r-Gz exposure p less than 0.001). Despite the fact that there was no exposure to negative acceleration all measured physiological parameters displayed same tendencies as for the regular push-pull.
Author
Education; Aerospace Medicine; Acceleration (Physics); Microgravity; Human Centrifuges

20070022626 Florida Univ., Gainesville, FL, USA
Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics
Seubert, Christoph N.; Janelle, Gregory M.; Price, Cahterine; Woodward, Jennifer J.; Kero, Frank A.; Booth, Matthew; Derendorf, Hartmut; Dennis, Donn M.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P23 - P-24; In English; See also 20070022623
Contract(s)/Grant(s): NNJ04HF74G; M01-RR00082; Copyright; Avail.: Other Sources

Astronauts may require anesthesia not only in the highly autonomous environments of space habitation or Mars-type missions, but also for immediate surgical care after evacuation from low orbital missions. Total intravenous anesthesia (TIVA) is most practical under microgravity conditions, because the equipment is compact. Little information is available how the physiologic adaptations to weightlessness affect the pharmacokinetics and pharmacodynamics of intravenously administered drugs in general and of anesthetics in particular. We therefore studied the effects of propofol in a randomized prospective crossover study comparing adaptation to normal gravity with microgravity simulated by 48 hours of antiorthostatic bed rest. The 10 volunteers matched astronauts in biometrics and health status. Despite evidence for changes in body fluid volumes, the response to propofol as measured clinically by a sedation scale and objectively by processed electroencephalogram (EEG) did not differ between normal gravity and simulated microgravity. Similarly, recovery of cognitive function was not significantly different between normal gravity and simulated microgravity. We conclude that 48 hours of antiorthostatic bed rest have no clinically significant effect on the anesthetic properties of propofol.
Author
Anesthesia; Anesthetics; Gravitational Effects; Microgravity; Pharmacology; Gravitational Physiology; Physiological Effects

20070022627 Kitasato Univ., Kanagawa, Japan
A Trial for Studying Effects of Gravity on the Fetus
Miki, Takeo; Abe, Shiori; Netsu, Yahiro; Yoshikawa, Fumihiko; Kamijo, Kaori; Hama, Masako; Yamasaki, Masao; Hazama, Akihiro; Shimizu, Tsuyoshi; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-175 - P-176; In English; See also 20070022623; Copyright; Avail.: Other Sources

We started studying the effect of gravity on the intrauterine fetus development as the first step for investigating reproduction process of the human being in the space environment. Reproduction is one of various components of sexuality which is an important and unavoidable factor for constructing a peaceful human society in space and for establishing a long-stay of the human being in a microgravitationl environment. In this experiment, we developed a method for measuring quantitatively the relation of movement of the mother to the posture of her fetus to estimate the effect of gravity on the fetus on the ground. We used a new model of ultrasonic which can show simultaneously movements of the fetus in three dimensions and a software for computing, which can analyze two dimensional movements, and established a method to demonstrate quantitatively a trend graph of change in posture of the fetus against the uterine wall axis of the mother. This method that we developed for study of reproduction in space should also endow the field of obstetrics medicine on the ground with benefit as well.
Author
Fetuses; Gravitational Effects; Uterus; Aerospace Environments; Human Beings

20070022628 Japan Aerospace Exploration Agency, Kanagawa, Japan
Living in Greenhouse Built on Mars
Yamashita, Masamichi; Katayama, Naomi; Mori, Shigeo; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-155 -P-156; In English; See also 20070022623; Copyright; Avail.: Other Sources

Conceptual design of space agriculture is developed for living on Mars. Major components of life support system are chosen with an attention on cultural and historical background of Japan. Hyper-thermophilic aerobic composting bacterial ecology, entomophagy, tree cultivation, and marine algae are proposed for closing materials circulation loop in space agriculture on Mars together with other candidates. Physiological and medical issues are discussed to define requirements for

habitation on Mars. Planetary protection would be one of important issues. Scenario is proposed for developing and verifying space agriculture system.
Author
Mars (Planet); Planetary Protection; Agriculture; Greenhouse Effect; Plants (Botany)

20070022629 Kansai Medical Univ., Osaka, Japan
Does a 16-Day Bed-Rest Cause a Deterioration of Executive Function?
Ishizaki, Yuko; Fukuoka, Hideoki; Tanaka, Hidetaka; Taniuchi, Shoichiro; Kaneko, Kazunari; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-21 - P-22; In English; See also 20070022623; Copyright; Avail.: Other Sources

Microgravity due to prolonged bed-rest may cause changes in cerebral circulation, which is related to higher brain function such as executive function. In this study, we evaluate the effect of simulated microgravity due to 6- degee head-down-tilt bed-rest (BR) on executive function among 12 healthy young men. The three kinds of psychoneurological tests, which can be administered to subjects, were conducted at baseline and Day 16 of BR. There was no difference in the results between the baseline and Day 16 on all tests, which indicated that executive function was not impaired. However, we cannot conclude that microgravity did not affect in executive function, because of possible contribution of the following factors: (1) timing of tests; (2) learning effect, or (3) too small changes in psychophysiology not enough to affect higher brain function. Measurements and imaging of cerebral blood flow during performing psychoneurological tests should be performed in future studies.
Author
Bed Rest; Brain Circulation; Cerebrum; Deterioration; Microgravity; Psychophysiology; Neurology

20070022631 Institute of Botany, Ukraine
Fluidity of Plasma Membranes of Pea Seedling Roots under Clinorotation
Klymchuk, Dmytro; Vorobyova, Tamara; Dubovy, Valeriy; Bezruk, Leonid; Baranenko, Valentina; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-123 - P-124; In English; See also 20070022623; Copyright; Avail.: Other Sources

This research aims to compare the seedling growth and fluidity of the lipid bilayer in plasma membranes (PM) isolated by aqueous two-phase partitioning from roots of pea (Pisum sativum L.) grown 6 days under clinorotation. The vesicles of the upper phase of the partitioning system presented by PM were taken for fluorescence studies using pyrene probe. The fluorescence spectra exhibited peaks characteristic of pyrene in its molecular (monomeric) (I(sub M)) form at 393 nm and excimer (I(sub E)) form resulting from formation of excited dimers at 470 nm. Clinorotation tended to an increase in the I(sub E)/I(sub M) ratio as well as to reduction in seedling growth and an elevation in the level of unsaturated fatty acids. The result suggests the involvement of the PM lipid fluidity in adaptation processes of seedling root cells to altered gravity conditions.
Author
Clinorotation; Seedlings (Botany); Plant Roots; Cell Membranes (Biology); Lipids; Fluid Flow; Plasma Composition; Membranes

20070022632 Fourth Military Medical Univ., Xi'an, China
Effects of Simulated Weightlessness on the Kinase Activity of MEK1 Induced by BMP-2 in Rat Osteosarcoma Cells
Wang, Bing; Zhang, shu; Wu, Yan-Hong; Wu, Xing-Yu; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-141 - P-142; In English; See also 20070022623; Copyright; Avail.: Other Sources

This study was aimed to explore the relationship of Shc and AP-1/TRE in MG63 osteosarcoma cells mechanotransduction and to survey its functional alteration in simulated weightlessness. One group MG63 cells were co-transfected with negative mutant of Shc (Shc-SH2) and the chimeric construct 4xTRE-P1-Luc. Another group cells were co-transfected with pcDNA3 together with 4xTRE-P1-Luc. Then, the effects of 1 h fluid shear stress (FSS) on the induction of AP-1/TRE were examined in the above cells. In lG terrestrial gravitational condition, FSS caused significantly increasing of luciferase activities in cells transfected with pcDNA3, and this FSS induction of luciferase activity was drastically reduced in cells transfected with Shc-SH2. As to the MG-63 cells cultured in simulated weightlessness by using clinostat, mechanical stimulation by 0.5 Pa FSS resulted, after 15 min, in increased amount of luciferase activities in cells transfected with pcDNA3. And stimulation continued throughout the next 45-minute 0.5 Pa FSS treatment period. These results suggested that FSS could induce the

transcriptional activation mediated by AP-1/TRE. And mechanotransduction in MG63 cells was affected by simulated weightlessness.
Author
Shear Stress; Weightlessness Simulation; Cells (Biology); Transcription (Genetics); Fluids; Osteoblasts; Gene Expression

20070022633 Universite de Caen Basse Normandie, Caen, France
Sympathetic Beta Antagonist Prevents Bone Mineral Density Decrease Induced by Labyrinthectomy
Denise, P.; Sabatier, J. P.; Corvisier, J.; Etard, O.; Levasseur, R.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. 95-96; In English; See also 20070022623; Copyright; Avail.: Other Sources

We previously showed that bilateral vestibular lesion in rats induces a bone loss in weight bearing bones. To determine whether this effect is mediated by the sympathetic nervous system (SNS), bone mineral density (BMD) was measured in 4 groups of 10 female Wistar rats: bilateral labyrinthectomy (Bilab), Bilab with propranolol treatment, sham operated with or without propranolol. In untreated rats, 30 days after lesion Bilab animals showed a reduced BMD in distal femoral metaphysis comparatively to intact rats (p less than 0.001): In treated rats, there was no difference in BMD 30 days after lesion. This protective effect of propranolol against bone loss suggests that the vestibular system influence on bone remodeling is mediated by SNS. If this hypothesis is correct, this could have important consequences in devising countermeasures to spaceflight induced bone loss.
Author
Bone Demineralization; Bone Mineral Content; Labyrinthectomy; Sympathetic Nervous System; Vestibules

20070022635 Osaka Univ., Toyonaka, Japan
Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period
Ohira, Yoshinobu; Kawano, Fumijnori; Watanabe, Sumiko; Nakano, Norihiko; Sakurai, Takuya; Ohno, Hideki; Hitomi, Yoshiaki; Izawa, Tetsuya; Suzuki, Kenji; Sudoh, Masamichi; Izawa, Tetsuya; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-151 - P-152; In English; See also 20070022623; Copyright; Avail.: Other Sources

The effects of long-term unloading and/or loading on the expression of 15 genes in brown adipose tissue (BAT) of rat pups were investigated particularly focusing on uncoupling protein (UCP) family, nitric oxide synthase (NOS) isoenzymes, and antioxidant enzymes. The animals in the unloaded group were hindlimb-unloaded by tail suspension between postnatal day 4 and month 3, followed by 2-month ambulation recovery. In another group, exposure to hypergravity at 2-G was also performed during the same period. Compared with the age-matched control group, significantly lower expression levels of mRNA for inducible NOS and Cu, Zn- superoxide dismutase (Cu, Zn-SOD) in BAT were observed immediately after unloading, but not exposure to 2-G. During the 2-month ambulation recovery from both extreme conditions, the expression of mRNA for Mn-SOD was enhanced, although the expression levels at 3-month was not different from the controls, suggesting an increased oxidative stress. These findings suggest that both unloading and overloading may have some influence upon the function of BAT, and that changes in the BAT function may be involved in the mechanisms responsible for the adaptation to such extreme conditions in which astronauts are exposed.
Author
Adipose Tissues; Gene Expression Regulation; Hindlimb Suspension; Rats; High Gravity Environments; Transcription (Genetics); Gravitational Effects

20070022636 Fondazione Don Gnocchi, Milan, Italy
A New Wearable System for Cardiorespiratory Monitoring during Gravitational Stress
Castiglioni, Paolo; Merati, Giampiero; Rizzo, Francesco; Faini, Andrea; Parati, Gianfranco; Ferratini, Maurizio; DiRienzo, Marco; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-163 - P-164; In English; See also 20070022623; Copyright; Avail.: Other Sources

We present a new wearable system for collecting cardiorespiratory and accelerometric data during experiments of gravitational physiology. It consists of a vest embedding textile sensors to obtain one ECG lead and respiratory movements, and a 3-axis accelerometer. Signals are transmitted to a PDA via wireless connection. Its capability to detect the ECG has been tested in free moving subjects. Its applicability in gravitational physiology studies has been tested during parachute jumps and a parabolic flight. The system transmitted ECG and accelerometric data without signal loss during both the experiments. Signal

quality was adequate to derive a complete tachogram, identify ectopic beats and correlate heart-rate changes with changes in acceleration.
Author
Electrocardiography; Gravitational Physiology; Stress (Biology); Vests; Heart Function

20070022637 Osaka Univ., Toyonaka, Japan
Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers
Kawano, Fuminori; Matsuoka, Yoshikazu; Oke, Yoshihiko; Higo, Yako; Terada, Masahiro; Wang, Xiao Dong; Lan, Yong Bo; Nakai, Naoya; Ohira, Yoshinobu; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-85 - P-86; In English; See also 20070022623
Contract(s)/Grant(s): JSPS-15200049; MOE-15700417; Copyright; Avail.: Other Sources

The present study was carried out to investigate the effects of overload on the nucleolar number of the myonuclei in the soleus muscle fibers of rats. Adult male Wistar rats were randomly separated into the pre-and post-experimental control, functionally overloaded (FO), sham-operated, deafferentated at the L(sub 4-5) segmental levels of spinal cord (DA), FO+DA, and hindlimbunloaded (U) groups. Soleus was sampled before and 2 wk after the treatments. Single fibers were isolated and silver and hematoxylin staining were performed. The number of nucleoli per myonucleus was counted in silver-stained single fibers. The mean number of nucleoli in the single myonucleus of the control rats was 1.6-1.7, although the FO (2.1) and FO+DA (2.0) increased the mean number. The U and DA did not affect the nucleolar number. These results suggested that the nucleoli, which are influenced by the mechanical stress, played some role(s) in the myonuclear function.
Author
Muscle Fibers; Rats; Loads (Forces); Nuclei; Stress Distribution; Mechanics (Physics)

20070022638 Caen Univ., France
Non-Invasive Tonometric versus invasive Radial Artery Blood Pressure during Altered Gravity Conditions
Normand, Here; Lemarchand, Erick; Arbeille, Philippe; Quarck, Gaelle; Vaida, Pierre; Duretete, Arnaud; Denise, Pierre; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-161 - P-162; In English; See also 20070022623
Contract(s)/Grant(s): 02/CNES/4800000032; Copyright; Avail.: Other Sources

The aim of the present study was to compare non-invasive radial artery tonometry blood pressure measurement with intra-radial pressure measurement during micro- and hyper-gravity generated by parabolic flights. Two subjects, equipped with an intra radial pressure line on the left arm and a Colin CBM-7000 beat-to-beat pressure measurement apparatus on the right arm were studied in a supine position. The mean and standard deviation of the beat-to-beat difference between tonometric and intra-radial blood pressure were calculated for systolic and diastolic arterial pressure in the three gravity conditions (lg, 0g and 1.8g) experienced during parabolic flight. The Colin CBM-7000 met the specifications required by the Association for the Advancement of Medical Instrumentation in Og environment. However, gravity significantly affected the difference between tonometric and intra-arterial blood pressure. We conclude that the Colin CBM-7000 can be used with confidence during space fight.
Author
Blood Pressure; Intraocular Pressure; Pressure Gages; Pressure Measurement

20070022639 Fujita Health Univ., Japan
Eye Movements of Flatfish for the Changes of Gravity
Iwata, Kaori; Takabayashi, Akira; Miyachi, Ei-Ichi; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-15-P-16; In English; See also 20070022623; Copyright; Avail.: Other Sources

In this study, we analyzed the eye movements of flatfish for body tilting and compared with goldfish. The fish was fixed on the tilting table controlled by computer. The eye movements for body tilting along the different body axis were video-recorded. The vertical and torsional eye rotations were analyzed frame by frame. In normal flatfish, vertical eye movement of left eye to leftward tilting was larger than that to rightward tilting. For head up or head down tilting, clear vertical eye movements were observed. On the other hand, torsional eye movements showed similar characteristics as goldfish. These results suggested that sacculus and lagena were important for otolith-ocular eye movements in flatfish.
Author
Eye (Anatomy); Eye Movements; Fishes; Gravitation; Vestibular Tests

20070022641 National Academy of Sciences, Kyiv, Ukraine

Simulated Microgravity Affects the Plant Nucleolar Protein NopA100

Sobol, Margarita A.; Kordyum, Elizabeth L.; Gonzalez-Camacho, Fernando; Medina, Francisco Javier; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-133 - P-134; In English; See also 20070022623

Contract(s)/Grant(s): YSF20021/2-144; ESP2001-4522-PE; ESP2003-09475-C02-02; Copyright; Avail.: Other Sources

We reveal a major nucleolar protein homologous to the mammalian nucleolin and to the onion nucleolin-like protein NopA100 in the nuclear insoluble protein fraction from Lepidium sativum root meristematic cells with the method of nonspecific silver staining and the crossreaction with anti-NopA100 antibodies. In 2D Western blots of the insoluble nuclear fraction, NopA100 was detected as a band stretching through a certain diapason of PI. In the samples obtained from seedlings grown in simulated microgravity, the spread of the PI range was shorter and was separated into two clusters as compared to the stationary control that indicates a lower phosphorylation of the protein. This suggests a decrease in the level of nucleolar activity in simulated microgravity.

Author

Mammals; Microgravity; Proteins; Computerized Simulation; Cells (Biology); Plants (Botany); Nucleons

20070022642 Institut de Medecine Aerospatiale du SSA, Bretigny, France

Cerebral Oxygenation Control is Maintained under Push-pull Effect at Low Gz Level Exposure

Tran, C. C. D.; Berthelot, M.; Etienne, X.; Jouanin, J-C; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-159 - P-160; In English; See also 20070022623; Copyright; Avail.: Other Sources

In order to determine the implication of the cerebral oxygenation control occurring under -G(sub z) acceleration in the mechanism of the push-pull effect, four healthy male non-pilots were submitted to a control centrifugation at +2.5 G(sub z), and then to three experimental runs with identical +2.5 G(sub z) plateau, but preceded by -2 G(sub z) exposure for 5, 10 and 15 s. Changes in frontal cerebral oxygenated, deoxygenated and total hemoglobin concentrations were measured by using near infrared spectroscopy. The decrease in blood pressure was more important during the experimental runs, when the change in cerebral oxygenation and cerebral blood volume was not different. We conclude that the efficiency of the cerebral oxygenation control is maintained during +G, acceleration despite the occurrence of a push-pull effect.

Author

Blood Volume; Cerebrum; Oxygenation; Gravitational Effects; Gravitational Physiology

20070022643 Yamanashi Univ., Kofu, Japan

Change in Spatial Orientation of Optokinetic Nystagmus and Optokinetic After-Nystagmus in Cats under Side-Down Tilt Conditions

Kitama, Toshihiro; Shimamiya, Tamiyasu; Sato, Yu; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-9 - P-10; In English; See also 20070022623; Copyright; Avail.: Other Sources

The slow phase velocities (SPV) of optokinetic nystagmus (OKN) and after-nystagmus (OKAN) were examined in cats during side-down tilt. In the upright (UPR) position, the axis of SPV (direction of SPV vector) during OKN was always close to the stimulus axis. In side-down positions (right-side-down (RSD) and left-side-down (LSD)), yaw stimulation induced OKN with the vector deviating the stimulus axis toward the pitch axis to shift the SPV rotational plane toward the horizontal plane (cross-coupling), while pitch-axis stimulation induced no changes in vector direction. Cross-coupling was also found during OKAN. The SPV vector change of cat OKN/OKAN in head tilt could be fitted by changing the gain elements in the velocity storage integrator (VSI) model.

Author

Nystagmus; Eye (Anatomy); Physiological Effects

20070022644 Osaka Univ., Toyonaka, Japan

Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation

Matsunoka, Yoshikazu; Kawano, Fuminori; Wang, Xiao Dong; Terada, Masahiro; Higo, Yoko; Lan, Yong bo; Ogura, Akihiko; Nishimoti, Norhiro; Adachi, Yasno; Ohira, Yoshinobu; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-83 - P-84; In English; See also 20070022623

Contract(s)/Grant(s): JSPS-15200049; JSPS-15700417; MOH-16B-2; Copyright; Avail.: Other Sources

Down-regulation of immune system during the exposure to space environment is a serious problem for astronauts. To investigate the effects of inhibition of interleukin-6 (IL6) signaling pathway in muscle cell development, the C2C12 cells were cultured in the differentiation medium containing rat anti-mouse IL-6 receptor monoclonal antibody (MR16-1). The normal

proliferation of C2C12 cells during 3-day culture was inhibited by supplementation of MR16-1. In contrast, the percent distribution of the C2C12 cells expressing MyoD, myogenin, and myosin heavy chain was increased by MR16-1 treatment compared with the cells treated with phosphate-buffered saline. The results of the Western blot analysis also showed that the expression levels of fast myosin heavy chain, M-cadherin, phospho-p38, and MyoD were greater in the MR16-1-treated than in control cells. The results obtained from the present study indicate that IL-6 signaling pathway plays an important role in the muscle differentiation. It is also suggested that blockage of its pathway promotes muscle cell differentiation.
Author
Cells (Biology); Interleukins; Rats; Immunology; Histochemical Analysis; Blocking; Muscles

20070022645 Academy of Sciences (Russia), Moscow, Russian Federation
The Effects of Gravity Vector Randomization on Mouse Embryonic Stem Cells in vitro
Konstantinova, N. A.; Buravkova, L. B.; Manuilova, E. S.; Grivennikov, I. A.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-149 - P-150; In English; See also 20070022623
Contract(s)/Grant(s): FASI-02.467.11.3005; Copyright; Avail.: Other Sources

The effects of gravity vector randomization (clinorotation) on mouse embryonic stem cells (ESCs) of R1 line were studied. The ESCs were cultured by using mouse embryonic fibroblasts for saving undifferentiated state. The 17-33 passages oF ESCs were used in the following experimental groups: clinorotation, static control and control with gently mixed medium. The period of clinorotation was from 3 up to 6 days. The proliferation and first stage of ESCs differentiation were analyzed. It was shown that during long term clinorotation ESC proliferation did not change significantly. ES cells formed the normal colonies during 72 h clinorotation. Only slight decrease of ESC colony size was observed during first 24 hs of clinorotation. The differences between control and clinorotated cells colony sizes depended on period of clinorotation. Cell proliferation activity was increased after long term changes in gravity stimulation. It is suggested that ESCs maintained the viability and proliferative potential during clinorotation. However the number of embryonic bodies after clinorotation and constant medium mixing was slightly less than in static control. These data indicate the importance of local conditioning of culture medium at first stage of ESC differentiation.
Author
Gravitational Effects; In Vitro Methods and Tests; Mice; Embryos; Stem Cells; Clinorotation; Cells (Biology)

20070022646 Kiev National Univ., Kiev, Ukraine
The Effects of Clinorotation on the Process of Viral Infection in Potato Plants
Mishchenko, L. T.; Yu, Taran N.; Mishchenko, L. A.; Gordeychik, O. I.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-119 - P120; In English; See also 20070022623; Original contains black and white illustrations; Copyright; Avail.: Other Sources

A paper considers the influence of simulated microgravity (clinorotation) on the concentration of viruses in paternal plants as well as in regenerants of potato obtained from the apical buds of clinorotated plants. Three lines of virus-free regenerants in vitro culture have been obtained. Also investigated was the influence of simulated microgravity (clinorotation) on the content of virus in parent Crimskaya Rose potato regenerants were obtained from the apical buds of clinorotation also obtained were three lines virus-free regenerant.
Author
Clinorotation; Potatoes; Viral Diseases; Plants (Botany); Microgravity

20070022647 Universita degli Studi di Udine, Udine, Italy
Cell Culture Tests in the BIOLAB Flight Model
Ambesi-Impiombato, Saverio; Spelat, Renza; Brinckmann, Enno; Labreuille, Bertrand; Pefferkorn, Alexandre; Eche, Brigitte; Gasset, Gilbert; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-167 - P-168; In English; See also 20070022623; Copyright; Avail.: Other Sources

The BIOLAB facility in the Columbus Model on the International Space Station (ISS) is designed for experiments with cell cultures, small plants and small animals. The bio-compatibility of the Life Support System and of the Analysis Instruments had to be proven before final acceptance of the Flight Model (FM). In the cell culture test, rat thyroid normal cells (FRTL5) were incubated at 37 C under 5% CO2 atmosphere for 4 days under standard conditions. A Trypan Blue viability test was done with the BIOLAB FM Microscope. Both tests were completed successfully and demonstrated that these very sensitive cells

can be cultivated in BIOLAB without any apparent difference to the standard laboratory conditions. The test in the BIOLAB Microscope also showed that experiments can be evaluated remotely by 'telescience' procedures.
Author
Cells (Biology); Culture Techniques; International Space Station; Spaceborne Experiments; Space Laboratories; Research Facilities; Cell Culturing

20070022648 Academy of Sciences (Russia), Moscow, Russian Federation
Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight
Morukov, B. V.; Ivanova, S. M.; Maksimov, G. V.; Yarlikova, Yu. V.; Labetskaja, O. I.; Luneva, O. G.; Maksimova, N. V.; Brazhe, N. A.; Bryzgalova, N. Yu.; Parshina, E. Yu.; Nemirovskaya, T. L.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-139 - P-140; In English; See also 20070022623
Contract(s)/Grant(s): RFBR-05-04-49-798; Copyright; Avail.: Other Sources

Changes of the fluidity and permeability of human erythrocytes plasma membrane and hemoglobin hemoporphyrin conformation caused by the long-term space flight (SF) are investigated. During the early rehabilitation period we have found decrease in the plasma membrane fluidity and reversible increase in Na(+)/H(+) -exchange activity and an increase in the hemoglobin efficacy to hold oxygen (O2). During SF and rehabilitation period contents of hemoglobin and serum iron were reduced. In the most cases amount of erythropoietin increases during SF and decreases during rehabilitation period. It is supposed, that observed changes can result in the organism hypoxia.
Author
Erythrocytes; Hemoglobin; Permeability; Long Duration Space Flight; Fluids; Oxygen; Plasmas (Physics); Cell Membranes (Biology)

20070022649 Osaka Prefecture Univ., Sakai, Japan
Auxin Polar Transport is Essentially Required for Graviresponse in Early Growth Stage of Etiolated Pea Seedlings
Hoshino, Temeki; Miyamoto, Kensuke; Yamashita, Masamichi; Ueda, Junichi; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-113 - P-114; In English; See also 20070022623; Copyright; Avail.: Other Sources

When pea (Pisum sativum L. cv. Alaska) seeds were set and grown in a horizontal or an inclinational position on 1 g conditions in the dark, negative gravitropic response of epicotyls was found by differential elongation in the proximal and the distal side of epicotyls, respectively. Activities of auxin polar transport in the proximal side were much higher than those in the distal one in epicotyls of etiolated seedlings grown in a horizontal position, and its balance in between the proximal and the distal side changed in the seedlings grown in an inclinational position. Application of inhibitors of auxin polar transport, 2,3,5-triiodobenzoic acid (TIBA) , N-(1-naphtyl) phthalamic acid (NPA) and 9-hydroxyfluorene-9-carboxylic acid (HFCA), substantially inhibited negative gravitropic response of epicotyls, but anti-auxin, p-chlorophenoxyisobutyric acid (PCIB), did not. Accumulation of mRNAs of PsPINl encoding an auxin efflux facilitator and of auxin-inducible gene, PsIAA4/5, in etiolated epicotyls grown in a horizontal position was also asymmetrical in between the proximal and the distal side of epicotyls. On the other hand, the asymmetrical accumulation of these genes was not observed in epicotyls grown in an inclinational position. These results strongly support the idea that auxin polar transport is essentially required for graviresponse of epicotyls in early growth stage of etiolated pea seedlings.
Author
Gravitropism; Seedlings (Botany); Plants (Botany); Auxins; Etiology; Transcription (Genetics)

20070022651 Principal Military Hospital, Luanda, Angola
Gravitational Conception of Essential Hypertension
Dorogovtsev, V.; daSilva, B.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-63 - P-66; In English; See also 20070022623; Copyright; Avail.: Other Sources

Essential Hypertension remains one of the most widely spread diseases characterized by high level of mortality and physical inability. Significant orthostatic changes of arteria1 pressure at healthy individuals are Essential Hypertension (EH) harbingers. These data were shown in the completed impressive prospective studies with application of orthostatic test. The comparative analysis of orthostatic hemodynamics changes at the healthy persons and patients with EH has revealed significant distinctions. All these data have allowed formulating the gravitational concept provisions. The main reason of EH is some kind of disorder in central regulation of cardiovascular system The disorder results in inadequate hemodynamic response at hydrostatic pressure changes. In the beginning it results to functional membranous alteration then in structure

changes of vascular wall and further to arterial pressure increasing. The phylogeneticaly new function of the vasomotor centre on maintenance of gravitational hemodynamic stability is sensitive to influence of risk factors, which greatly accelerate the course of the disease.
Author
Cardiovascular System; Gravitational Effects; Hemodynamic Responses; Hypertension; Gravitational Physiology

20070022652 Nara Women's Univ., Japan
Baroreflexes and Renal Function
Miki, Kenju; Yoshimoto, Misa; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-61 - P-62; In English; See also 20070022623; Copyright; Avail.: Other Sources

Water immersion (WI) causes natriuresis in humans and dogs. In the present paper we review the role of renal sympathetic nerve activity in regulating sodium excretion and the mechanisms underlying the sustained reduction of renal sympathetic nerve activity during WI in conscious dogs. Renal sympathetic nerve activity was decreased by 43% during WI. Chronic renal denervation abolished the natriuresis. These data suggest that the sustain reduction in renal sympathetic nerve activity seems to play a critical role in inducting the natriuresis during WI. Total cardiac denervation attenuated the responses in sodium excretion and renal sympathetic nerve activity to WI in dogs. We further demonstrated that the loading of cardiopulmonary baroreceptors during WI resulted in an acute shift in the baroreflex control of renal sympathetic nerve activity. In conclusion, cardiac-renal reflex is likely the critical pathway inducing the sustained reduction in renal sympathetic nerve activity and increase in sodium excretion during WI.
Author
Baroreflexes; Renal Function; Sympathetic Nervous System; Cardiovascular System; Water Immersion

20070022653 Academy of Sciences (Russia), Moscow, Russian Federation
Effect of Dry Immersion of Various Durations in Combination with Artificial Stimulation of Foot Support Zones upon Force-Velocity Characteristics of Knee Extensors
Netreba, A. I.; Khusnutdinova, D. R.; Vinogradova, O. L.; Kozlovskaya, I. B.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-71 - P-72; In English; See also 20070022623
Contract(s)/Grant(s): RFBR-N-06-04-49699; MOE-GS-KP.6/002; Copyright; Avail.: Other Sources

The effect of 3- and 7- days dry immersion in combination with artificial stimulation of foot support zones upon force-velocity characteristics of knee extensors was investigated. 19 subjects were exposed to 3-7 days dry immersion and to dry immersion in combination with an artificial stimulation of foot support zones. After 3 days dry immersion no noticeable changes of contractile properties of knee extensors were observed under all experimental conditions used. The artificial stimulation of support zones did not induce any changes in contractile properties either. 7 days dry immersion caused a significant decrease of force velocity characteristics of knee extensors under isokinetic conditions in the whole range of angular velocities used and under isotonic condition only in the higher range of loads. Artificial foot support zones stimulation abolished practically completely the decrease of knee extensors force under all experimental conditions.
Author
Stimulation; Submerging; Drying; Knee (Anatomy); Feet (Anatomy); Supports; Angular Velocity

20070022654 Osaka Univ., Osaka, Japan
Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity
Horii, Arata; Uno, Yoshihiro; Uno, Atsuhiko; Kitahara, Tadashi; Mitani, Kenji; Masumura, Chisako; Nakagawa, Aya; Kubo, Takeshi; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-29 - P-30; In English; See also 20070022623; Copyright; Avail.: Other Sources

Recovery from balance disorders after space flight is supposed to reflect the process of readaptation to 1G environment from microgravity. Linear acceleration including gravity is sensed by otolithic pathways. Therefore, it could be assumed that possible plastic changes which have influences on the otolithic pathways &om the level of the vesh%ukir periphery to the level of neurotransmission in the central vestibular system might be responsible for the adaptation to altered gravity. The aim of the present study is to clarify the mechanisms responsible for the adaptation to altered gravity by examining the molecular biological changes in the rat peripheral and central vestibular systems following hypergravity (2G). Hypergravitational environment was produced by a centrifuge device. For this purpose, we investigated the changes in morphology and synthesis of otoconia and mRNA expression of various glutamate receptor subunits/subtypes in the vestibular ganglion cells, vestibular nuclei and vestibulocerebellum following hypergravity using real-time quantitative PCR methods. The results showed that

neither morphology nor synthesis of otoconia was affected by hypergravity, suggesting that otoconia itself has only minor role in the adaptation to altered gravity. The mRNA expression of GluR2 and NRl receptors in the uvula/nodulus increased in animals exposed to 2 hs-hypergravity, and it decreased gradually to the control level. The mRNA expression of GluR2 receptors in vestibular ganglion cells decreased in animals exposed to 1 week-hypergravity. It is suggested that the animals adapted to the hypergravity by enhancing the cerebellar inhibition of the vestibular nucleus neurons through activation of the NR1 and GluR2 receptors on the Purkinje cells in uvula/nodulus especially at the early phase following hypergravity. In the later phase following hypergravity, the animals adapted to the hypergravity by reducing the neurotransmission between the vestibular hair cells and the primary vestibular neurons via downregulation of the post-synaptic GluR2 receptors in the vestibular periphery.
Author
Cerebellum; Cerebral Cortex; High Gravity Environments; Vestibular Tests; Central Nervous System; Morphology; Molecular Biology; Peripheral Nervous System

20070022655 Osaka Univ., Toyonaka, Japan
Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human
Terada, Masahiro; Kawano, Fuminori; Xiao, Dong Wang; Matsuoka, Yoshikazu; Ochiai, Toshimasa; Inada, Hiroyuki; Ohira, Yoshinobu; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-33 - P-34; In English; See also 20070022623
Contract(s)/Grant(s): JSPS-15200049; MOE-15700417; Copyright; Avail.: Other Sources

Effects of gravity level on the motor task, in which the subject lifted one arm to the horizontal position with eyes open or dosed, or with up-side-down visual input by wearing a pair of prism glasses, were studied during parabolic flight. The greater burst of electromyogram (EMG) in deltoid was noted than infraspinatus in response to the arm lifting. The EMG burst in both deltoid muscle and infraspinatus muscle was inhibited during the exposure to micro-G, but was enhanced in the hyper-G environment. The angle of shoulder joint was decreased when the gravity was increased from 1- to 2-G or micro- to 1.5-G generally, regardless of the visual input. And it was hyper-extended in micro-G than 2-G environment in 7 out of 9 cases. It was suggested that the gravity-related sensory input from the muscle plays an important role in the movement regulation of the muscle itself, although the role of visual input is still unclear.
Author
Exposure; High Gravity Environments; Microgravity; Arm (Anatomy); Gravitational Effects; Efferent Nervous Systems; Joints (Anatomy); Human Beings

20070022657 Tokyo Medical and Dental Univ., Japan
Phenotypes, Signaling, and Apoptotic Features of Osteoblasts in Microgravity
Kumei, Yasuhiro; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-125 - P-128; In English; See also 20070022623; Copyright; Avail.: Other Sources

We conducted space flight (STS-65) experiments using primary culture of rat osteoblasts in the presence and absence of l-alpha, 25 dihydroxyvitamin D3. All the cultures were solubilized on board during the mission after collecting the conditioned media. Growth inhibition or apoptosis occurred during the earlier days of spaceflight, but recovered during the later days of the mission. The vitamin D-inducible osteocalcin production was suppressed during spaceflight. Microgravity enhanced production of PGE2 and IL-6. The TGF-Beta-I production was reduced by microgravity in concomitant with decrease of the collagen-specific molecular chaperone HSP47. Microgravity also deteriorated the action and signaling of IGF-I. Microgravity increased the mRNA levels of the platelet activating factor receptor and Gaq subunit of the GTP-binding protein. The apoptosis-related Jun-N-terminal kinase and novel protein kinase C family were up-regulated during spaceflight. Microgravity induced nitric oxide synthase but concomitantly recruited GTP cyclohydrolase as an anti-apoptotic mode of action. Microgravity modulated various signaling pathways for induction or prevention of apoptosis. These molecular events in osteoblasts may refer to spaceflight-induced osteopenia.
Author
Bone Demineralization; Bone Mineral Content; Osteoblasts; Microgravity; Weightlessness; Gravitational Effects; Gravitational Physiology; Phenotype

20070022658 Waterloo Univ., Ontario, Canada

WISE-2005: Adrenergic Responses Before and After 60 Days of 6 Degree Head-Down Bed-Rest in Women

Edgell, H.; Dyson, K.; Shoemaker, J. K.; Custaud, M. A.; Arbeille, Ph.; Greaves, D.; Hughson, R. L.; Hughson, R. L.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-37 - P-38; In English; See also 20070022623; Copyright; Avail.: Other Sources

Sixteen women who participated in the WISE-2005 headdown bed rest (HDBR) were studied before and on day 56 of bed rest to test the hypothesis that chronic changes in circulating norepinephrine (NOR) would change the response to adrenergic receptor agonists. Five minute infusions of 2 doses of isoproterenol (ISO), and 2 doses of NOR were administered while heart rate (HR), mean arterial pressure (MAP) and total peripheral resistance (TPR) were measured. Before HDBR, the higher dose of ISO increased HR by 13 beats/min (P<O.OOl) and decreased TPR by -50% (P<O.OOl) with no changes in MAP, the higher dose of NOR increased MAP by 8 mmHg (P<O.OOl) and increased TPR -20% (P=0.007) with no change in HR. On HDBR day 56, subjects who took part in daily exercise+lower body negative pressure (EX+LBNP) countermeasures had no change in HR response to ISO while the control group (CON) had greater increases in HR. MAP tended to be lower post-HDBR in CON but not in EX+LBNP, while TPR was higher in both groups. In response to NOR, MAP increased with elevated TPR with no change in HR. Post-HDBR TPR increased more in the EX+LBNP group. These studies indicate that HDBR alters the HR response to IS0 but that EX+LBNP countermeasure prevented this change. The greater TPR response to NOR in the post-HDBR for the EX+LBNP group might reflect enhanced peripheral vasoconstrictor response that could reduce the risk of orthostatic intolerance after this countermeasure.

Author

Adrenergics; Bed Rest; Females; Head Down Tilt

20070022659 Radboud Univ., Nijmegen, Netherlands

On Gravity and Grooves

Loesberg, W. A.; vanLoon, J. J. W. A.; Walboomers, X. F.; Jansen, J. A.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-129 - P-130; In English; See also 20070022623

Contract(s)/Grant(s): MG-057; MG-063; Copyright; Avail.: Other Sources

This study evaluated in vitro the differences in morphological behaviour between fibroblast cultured on smooth and microgrooved substrata, which undergo hypergravity by centrifugation (10, 25, and 50g; or lg control). Microscopy and image analysis showed that the fibroblasts aligned along the groove direction on all textured surfaces. On the smooth substrata (control) cells spread out in a random fashion. The alignment of cells cultured on grooved surfaces increased with higher g-forces until a peak value at 25g. ANOVA was performed on the data, for all main parameters: topography, gravity force, and time. In this analysis, all parameters proved significant. In addition, most gene levels were reduced by hypergravity. Still, collagen type 1 and fibronectin are seemingly unaffected by time or gravity. From our data it is concluded that the fibroblasts primarily adjust their shape according to morphological environmental cues like substratum surface, hypergravity plays a secondary role.

Author

Alignment; Fibroblasts; Grooves; Gravitational Physiology; Gravitational Effects

20070022660 Institute of Botany, Ukraine

Long-Term Clinorotation Affects the Amyloplast Structure and Starch Composition in Potato Minitubers

Nedukha, Olena; Kordyum, Elizabeth; Martyn, Galina; Schnyukova, Elizaveta; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-105 - P-106; In English; See also 20070022623; Original contains black and white illustrations; Copyright; Avail.: Other Sources

The structural and functional organization of amyloplasts in the storage parenchyma of potato minitubers grown under long-term slow horizontal clinorotation (2 rpm) has been studied. Modified nutrient medium was used for minituber optimal growth in the experiments. Electron-microscopic and biochemical methods have been used. The changes in amyloplast structure and function were revealed under cliiorotation, namely: more plastid size heterogeneity, an appearance of gigantic amyloplasts, a decrease in the amylose content in starch, and an increase in the starch content in minitubers. Long-term clinorotation is supposed to influence starch synthesis rate and quality in plant storage organs.

Author

Clinorotation; Potatoes; Starches; Plants (Botany); Biochemistry; Organelles

20070022661 Osaka Kyoiku Univ., Japan

Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats

Ohira, Takashi; Morikuni, Sayaka; Wang, Xiao Dong; Terada, Masahiro; Kawano, Fuminori; Matsuoka, Yoshikazu; Higo, Yoko; Lan, Yong Bo; Seki, Takaharu; Ohira, Yoshinobu; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-79 - P-80; In English; See also 20070022623

Contract(s)/Grant(s): JSPS-15200049; MOE-15700417; MOH-16B-2; Copyright; Avail.: Other Sources

Effects of hindlimb suspension on the properties of adductor longus muscle was studied in 5-wk-old male Wistar Hannover rats. Hindlimb suspension with or without 16-day recovery was performed for 16 days. The expression of myosin heavy chain (MHC) and specific activities of succinate dehydrogenase and a-glycerophosphate dehydrogenase, as well as fiber cross-sectional area, were analyzed in serial cross-sections. Significant shift of fibers toward fast-twitch type and atrophy were noted in the suspended group. The % of pure type I MHC fibers was decreased to approximately half of the pre-suspension level and type I+II fibers was increased. Re-loading for 16 days was not enough for the complete recovery. The responses of enzyme activities to unloading were not prominent. It is suggested that adductor longus of Wistar Hannover rat is very susceptible for gravitational unloading relative to other species, although the precise mechanism is still unclear.

Author

Atrophy; Enzyme Activity; Muscles; Gravitational Physiology; Gravitational Effects; Physiological Effects

20070022662 Fourth Military Medical Univ., Xi'an, China

Daily 1-H Standing Can Prevent Changes in A0 and ATlR Expressions in Arterial Tissues of Simulated Microgravity Rats

Gao, Fang; Wei-Quan, Huang; Lan, Sun; Li-Fan, Zhang; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-51 - P-52; In English; See also 20070022623; Original contains black and white illustrations; Copyright; Avail.: Other Sources

This study was designed to investigated whether 1 h/d STD can also prevent differential changes in expressions of both A(sub 0) and AT(sub 1)R in the arteries from fore and hind body parts of 28-d simulated microgravity (SUS) rats by immunohistochemistry. Immunohistochemistry showed that the staining for both A(sub 0) and AT(sub 1)R was more intense in the media and adventitia and perivascular tissue of carotid artery of SUS than in that of control (CON) rats (p less than 0.05) and 1-h/d STD prevented such changes. On the contrary, less intense staining was observed in the adventitia and perivascular tissue and media of superior mesenteric artery of SUS than CON rats (P less than 0.05) and the changes due to SUS was also prevented by 1 h/d STD. Findings of the present study strongly support that vascular L-RAS may play a pivotal role in differential vascular adaptation to microgravity.

Author

Arteries; Microgravity; Rats; Immunology; Histochemical Analysis; Cardiovascular System; Gene Expression; Tissues (Biology); Weightlessness Simulation

20070022663 Russian Academy of Natural Sciences, Moscow, Russian Federation

Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2

Domaratskaya, E. I.; Payushina, O. V.; Butorina, M. N.; Nikonova, T. M.; Grigorian, E. N.; Mitashov, V. I.; Tairbekov, M. G.; Almeida, E.; Khrushchov, N. G.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-205 - P-208; In English; See also 20070022623; Copyright; Avail.: Other Sources

Intact and operated newts Pleumdeles waltl flown on Foton-M2 for 16 days were used to study the effects of spaceflight as well as tail amputation and lensectomy on their hemopoiesis. The flight did not produce noticeable changes in the peripheral blood of nonoperated newts. However, in operated animals, the number of lymphocytes increased whereas that of neutrophils decreased. There were no morphological differences in hemopoietic organs (liver and spleen) between flown non-operated and operated animals or their controls. However, in both non-operated and operated newts the liver weight and the number of hemopoietic cells in it increased. In contrast to nonoperated newts, space-flown mammals typically showed significant changes in blood cell counts. Experiments with BrdU incorporation revealed labeled cells in the hemopoietic area of the liver as well as in blood and spleen. This observation gives evidence that the BrdU label can be used to study proliferation of hemopoietic cells.

Author

Hematopoiesis; Amphibia; Blood Cell Count; Blood Cells; Physiological Effects; Biological Effects; Blood; Cells (Biology); Vertebrates

20070022664 Fourth Military Medical Univ., Xi'an, China

Daily 1-H Standing Can Prevent Changes in Calcium Current of Vascular Myocytes Isolated from Small Mesenteric but not Cerebral Arteries after 3-Day Simulated Microgravity in Rats

Xue, Jun-Hiu; Xie, Man-Jiang; Ma, Jin; Zhang, Li-Fan; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-53 - P-54; In English; See also 20070022623; Original contains black and white illustrations

Contract(s)/Grant(s): NSFC 3047049; Copyright; Avail.: Other Sources

This study was designed to clarify whether a 3-day simulated microgravity could induce differential adaptational changes of the L-type calcium channels (Ca(sub L)) in the cerebral and hindquarter arterial vascular smooth muscle cells (VSMCs), and whether these changes could be prevented by daily 1-h -Gx (dorsoventral) gravitational loading. Tail suspension (SUS) for three days was used to simulate early cardiovascular changes to microgravity. Daily standing (STD) for 1 hour was used to provide short-period 4, as gravity-based countermeasure. Whole-cell recording showed that after 3-d tail suspension (SUS), the current density of L-type calcium channels (CaL) of the cerebral and small mesenteric arterial VSMCs significantly increased and decreased, respectively. Daily STD for 1 h prevented the decrease of CaL current density in small mesenteric arterial VSMCs, but it did not prevent the increase of CaL current density in cerebral arterial VSMCs. These findings suggest that the differential adaptational change of CaL is an immediate and early adaptive response which persists during the simulated microgravity. However, the differential efficacy of 1 h/d-STD in counteracting adaptational functional changes of Ca(sub L) in hindquarter and cerebral arterial VSMCs just reveals the complexity of the underlying mechanism which remains to be elucidated.

Author

Arteries; Microgravity; Rats; Weightlessness Simulation; Hindlimb Suspension; Calcium; Cardiovascular System; Muscle Cells

20070022665 NASA Ames Research Center, Moffett Field, CA, USA

Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2

Almeida, E. A. C.; Roden, C.; Phillips, J. A.; Yusuf, R.; Globus, R. K.; Searby, N.; Vercoutere, W.; Morey-Holton, E.; Tairbekov, M.; Grigoryan, N.; Domaratskaya, E.; Poplinskaya, V.; Mitashov, V.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-185 - P-188; In English; See also 20070022623

Contract(s)/Grant(s): RFBR-04-04-48044; RFBR-05-04-48502; Copyright; Avail.: Other Sources

Terrestrial organisms exposed to microgravity during spaceflight experience musculoskeletal degeneration. It is still not understood if longer-term exposures to microgravity induce degeneration in other tissues, and if these effects are also observed in neutrally buoyant aquatic organisms that may be pre-adapted to mechanical unloading. The 'Regeneration' experiment conducted collaboratively between Russian and US scientists for 16 days in the Russian Foton M-2 spaceflight sought to test the hypothesis that microgravity alters the proliferation of cells in regenerating tail tissue of the newt Pleurodeles waltl. Our initial results indicate that we successfUlly delivered the proliferation marker 5-bromo-2'-deoxy Uridine (BrdU) during spaceflight, and that it was incorporated in the nuclei of cells in regenerating tissues. Cells in spaceflight tail regenerates proliferated at a slightly slower rate and were more undifferentiated than those in ground synchronous controls. In addition, the size of regenerating tails from spaceflight was smaller than synchronous controls. However, onboard temperature recordings show that the temperature in spaceflight was about 2 C lower than ground synchronous controls, possibly explaining the observed differences. Additional post-facto ground controls at matched temperatures will correctly determine the effects of spaceflight on regenerative cell proliferation in the newt.

Author

Microgravity; Musculoskeletal System; Organisms; Regeneration (Physiology); Amphibia; Weightlessness; Gravitational Physiology; Physiological Effects

20070022666 Charite Campus Benjamin Franklin, Berlin, Germany

Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies

Blottner, Dieter; Salanova, Michele; Puettmann, Britta; Schiffl, Gudrun; Felsenberg. Doeter; Rittweger, Joern; Ganga, Hanns-Christian; Schoser, Benedikt; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-67 - P-68; In English; See also 20070022623

Contract(s)/Grant(s): DLR-50WB0145; DLR-50WB0521; ESA-14431/03/NL/SH2; Copyright; Avail.: Other Sources

Prolonged bed rest is a widely accepted human body deconditioning model for studying neuromusculoskeletal atrophy and for the development of effective countermeasure protocols to overcome impaired performance control of immobilized patients on Earth as well as of astronauts in prolonged spaceflights. We here review our main results from three different countermeasure protocols on muscle structure and expression of signaling molecules performed during three international

long-term bed rest studies performed in Toulouse, France and Berlin, Germany, 2001-2005. Our major aims were to document muscle fiber size, fiber type MI distribution patterns, and differential expression of nitric oxide synthases (NOS1 -3) i.e., markers of muscle activity, in muscle biopsies of bedridden male and female volunteers with and without physical exercise. In bed rest, maximal resistive exercise (MRE) clearly maintained the structure and myofiber composition in knee extensor vastus lat. and plantar flexor soleus muscle (cf. Toulouse LTBR). Daily frequency-controlled resistive-like vibration exercise (RVE), a short and simple protocol combining resistive load with reflexive-loop muscle coordination, fully preserved fiber size as well as fiber type IB distribution patterns preferentially in soleus calf muscle suggesting preservation of slow muscle phenotype (cf Bertln Bed Rest). In females, comparable changes on respective muscle parameters using MRE combined with LBNP treadmill exercise protocol (cf. WISE-Study) have been documented so far. In general, NOSl was always overexpressed in myofibers I or II independent of the muscle phenotype thus monitoring ambient muscle activity by each countermeasure protocol. As neurore flexive RVE particularly preserved postural soleus muscle force and phenotype short daily RVE bouts should be imple mented as an additional and simple co-protocol into future countermeasure programs to preserve performance control following prolonged hypokinesia, in rehabilitation on Earth, or during microgravity exposure in Space.
Author
Atrophy; Countermeasures; Microgravity; Muscles; Muscular Function; Musculoskeletal System; Physical Exercise; Skeletal Muscle; Gravitational Effects

20070022667 Fourth Military Medical Univ., Xi'an, China
Coordinated Switching of Myofilament Protein Isoforms via Gene Regulation and Alternative Splicing during Skeletal Muscle Adaptation
Yu, Zhi-Bin; Gao, Fang; Feng, Han-Zhong; Jin, Jian-Ping; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. 69-70; In English; See also 20070022623; Copyright; Avail.: Other Sources

To understand the molecular basis of the contractility changes during muscle adaptation, we investigated the expression myofilament protein isoforms in slow and fast fiber muscles of tail-suspended rats. Atrophy and decreased contractility was produced in the unloaded soleus but not EDL. Myosin heavy chain (MHC) isoform I was decreased in the unloaded soleus together with an increase in MHC I1 splicing variants. Tropomyosin showed decreases in gamma and beta isoforms and an increase in alpha isoform, resulting in an alpha/beta ratio similar to that in EDL. Troponin I and troponin T (TnT) showed a decrease in slow and an increase in fast isoforms. The results suggest that the regulation of myofilament protein isoform expression forms a basis of the contractility changes in the unloaded soleus muscle. The unloaded soleus muscle also showed faster declining of tension during prolonged tetanic contraction, becoming similar to the fast muscle. This decreased tolerance to high frequency fatigue stimulation suggests a role of myofilament protein isoforms in the determination of muscle fiber type characteristics. The temporal relationship between the protein switching and the changes in contractility suggests an initial role of TnT isoforms. When the fast TnT gene expression is up-regulated in the unloaded soleus, altered alternative RNA splicing produced more high molecular weight acidic isoforms which may confer a compensation for the decrease in slow TnT. The data demonstrate a role of the thin filament regulatory protein isoforms during the functional adaptation of skeletal muscle.
Author
Adaptation; Gene Expression; Muscles; Musculoskeletal System; Myosins; Proteins; Skeletal Muscle

20070022668 State Research Center of Russia, Moscow, Russian Federation
Study of Arterial Blood Pressure Dynamics in Conscious Rats with the Use of Wavelet Analysis
Vinogradova, O. L.; Borovik, A. S.; Tarasova, O. S.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-55-P-56; In English; See also 20070022623; Original contains black and white illustrations; Copyright; Avail.: Other Sources

The goal of this study was to investigate in conscious rats the changes in various rhythms in mean arterial pressure (MAP) during gradual hemorrhage and to correlate them with rat's behavior. The rats were bled through the catheter in carotid artery (- 30% of total blood volume during 30 min). Band-pass filtering and wavelet analysis revealed strong augmentation of respiratory oscillation (- 1 Hz) and Mayer waves (- 0.4 Hz) during nonhypotensive phase of hemorrhage, when the rats were quiet. A slow frequency oscillation (- 0.1 Hz) developed during decompensatory phase; usually this was followed by movement. Similar MAP dynamics was observed in rats after 2-week suspension. During restoration MAP level in two groups did not differ but heart rate in postsuspension rats was lower than in controls.
Author
Arteries; Blood Pressure; Rats; Wavelet Analysis; Blood Circulation

20070022669 Milan Univ., Italy

Autonomic Adaptation to a Microgravity-Like Environment in Pregnant Women

Merati, Giampiero; Castiglioni, Paolo; Rampichini, Susanna; Roselli, Mariangela; Pizzini, Giuliano; Veicsteinas, Arsenio; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. 57-58; In English; See also 20070022623; Copyright; Avail.: Other Sources

Cardiovascular adaptation to head-out water immersion, which mimics microgravity, was assessed in 6 late pregnant women Five-min series of RR intervals were recorded in basal state (B) and in 2 different environments (G, gym, 22 C; W, water immersion, 34 C) in 3 experimental conditions for each environment: 1) resting supine; 2) during upright mild and 3) moderate lower limbs exercise. Compared to B, HR increased significantly in 1), 2) and 3) conditions ($p < 0.05$) in both G and W environments. LF/HF ratio significantly increased at rest in G (5.0 +/- 2.4, $p< 0.05$) but not in W (2.8 +/- 1.6), whereas it further increased during mild and moderate exercise in both G and W. LF/HF power ratio significantly increased (6.5 +/- 2.6, $p=0.01$) during ventilation in supine position in G only. HF power decreased at rest in both G and W, whereas LF power was unchanged. Water immersion seems to improve the autonomic adaptation to supine position and exercise, in late pregnant women.

Author

Adaptation; Females; Water Immersion; Pregnancy; Cardiovascular System; Weightlessness Simulation; Physical Exercise

20070022670 Centre Hospitalier Univ., Tours, France

Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume

Kerbeci, P.; Capri, A.; Pascaud, L.; Bell, V.; Viguier, F.; Arbeille, P.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-157 - P-158; In English; See also 20070022623; Copyright; Avail.: Other Sources

Atrophy appears rapidly on subjects in head down bedrest. The objective of the present project was to design an echographic system that could collect and process the ultrasound images required to calculate the volume of selected lower limb muscle. An echographic probe (5 MHz sector curved array) was fixed on a probe holder which moved, along 2 parallel metallic rails of 25 cm long and distant by 6 cm, thanks to a small electrical engine. The probe holder was oriented in order to acquire transverse cross section view. The successive images were transferred to a computer for being labelled and processed

Author

Atrophy; Muscles; Thigh; Probes; Motors; Human Factors Engineering; Volume; Ultrasonics

20070022671 Fukushima Medical Univ., Fukushima, Japan

Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight

Miyake, Masao; Yamasaki, Masao; Waki, Hidefumi; Katahira, Kiyoaki; Nagayama, Tadanori; Katsuda, Shin-ichiro; Nielsen, Soren; Hazama, Akihiro; Shimizu, Tsuyoshi; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-153 - P-154; In English; See also 20070022623; Copyright; Avail.: Other Sources

In previous studies, we reported hydronephrotic kidneys in neonatal rats after spaceflight. And we analyzed the relationship between spaceflight and upper urinary tract in this study. Flight rats performed: 1) relatively large kidney, 2) slightly expanded ureter, 3) smaller glomerulus, 4) water intake increase. These results were typical symptoms of obstructive nephropathy during postnatal development. Aquaporins (AQPs) were regulated in ureter with hydronephrotic kidney in flight rats. c-kit immunoreactivity was also down-regulated in renal cortex of Flight rats. These regulations adjust water permeability through upper urinary tract on purpose for water homeostasis.

Author

Rats; Space Flight; Urology; Immunology; Histochemical Analysis; Aerospace Medicine

20070022672 Gifu Univ., Gifu, Japan

Roles of Vestibular and Somatosensory System in Controlling Arterial Pressure during Free Drop-Induced Microgravity

Tanaka, Kunihiko; Abe, Chikara; Awazu, Chihiro; Morita, Hironobu; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-7 - P-8; In English; See also 20070022623; Original contains black and white illustrations; Copyright; Avail.: Other Sources

Arterial pressure (AP) was measured during microgravity induced by free drop in conscious, freemoving rats with intact, vestibular lesions, and sinoaortic denervation (FM-Intact, FM-VL, and FM-SAD respectively). AP significantly increased in the FM-Intact and the FM-SAD, however, the increase was significantly lower in the FM-VL. No significant difference of the

increase was observed between the FM-Intact and the FM-SAD. However, bradyanythmia appeared in all rats of the FM-Intact was not seen in all rats of the FM-SAD. Effect of body floating on AP was also evaluated with a stabilizer (STAB-Intact and STAB-VL). The increase in AP in the STAB-Intact was significantly lower than that in the FM-Intact, but was still significant, while it was completely abolished in the STAB-VL. Thus, AP increases during microgravity in conscious rats, and the vestibular system and body stability are significantly involved in this response. Baroreceptors are playing an important role for arrhythmia during microgravity.
Author
Arteries; Microgravity; Sensory Perception; Aorta; Vestibular Tests; Sympathetic Nervous System; Pressure

20070022673 Institute of Botany, Ukraine
Interrelation Between Cytoskeleton Elements in Root Cells of Arabidopsis-GFP-MAP4 Seedlings under Clinorotation
Shevchenko, G.; Kalinina, Ya.; Kordyum, E.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. 107-108; In English; See also 20070022623
Contract(s)/Grant(s): INTAS 03-51-6459; Copyright; Avail.: Other Sources

To elucidate the plant growth in altered gravity we investigated the impact of clinorotation on the microtubule cytoskeleton arrangement in root cells of Arabidopsis thaliana transfected with MAP4, which decorates the tubulin cytoskeleton. Special attention has been paid to patterns of endoplasmic and cortical microtubules in root meristem and distal elongation zone (DEZ). Cytochalasin D was applied in order to reveal the involvement of actin microfilaments in the organization and functioning of microtubules under clinorotation. It has been found that cytochalasin treatment results in depolimerization of endoplasmic microtubules in meristem cells growing isotropically and cortical microtubules in DEZ where cells start to grow anisotropically. Clinorotation caused higher degree of microtubule damage in DEZ cells. We suggest the high sensitivity of DEZ to clinorotation and mutually dependant functioning of actin microfilaments and tubulin microtubules in cell response to altered gravity.
Author
Clinorotation; Plants (Botany); Seedlings (Botany); Vegetation Growth; Plant Roots; Cytology

20070022674 National Academy of Science of the Ukraine, Kiev, Ukraine
Clinorotation Affects the Microtubule Organization in Root Epidermis and Cortex Cells in Brassica Rapa Seedlings
Kalinina, Iana; Kordyum, Elizabeth; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. 109-110; In English; See also 20070022623
Contract(s)/Grant(s): INTAS 03-51 6459; Copyright; Avail.: Other Sources

The organization of endoplasmic and cortical microtubules (MT), in epidermis and cortex cells of the main root different growth zones in Brassica rapa L. 6- day old seedlings in the stationary conditions and under clinorotation has been investigated by means of confocal microscopy. Changes in MT orientation occurred only in cells of the distal elongation zone. In the control, cortical MT arrays were oriented transversely to a root long axis. Under clinorotation, MT transversal orientation was disturbed, and an appearance of shorter randomly organized MTs was observed. Simultaneously, a significant decrease in a cell length was shown to be in the central elongation zone under clinorotation. It is suggested that a decline of anisotropic growth, which is typical for cells in this zone, is caused by cortical MT disorientation in the distal elongation zone under clinorotation.
Author
Clinorotation; Epidermis; Seedlings (Botany); Cortexes (Botany); Plant Roots

20070022675 Academy of Sciences (Russia), Moscow, Russian Federation
Rat Soleus Muscle Properties and Serum 1GF-1 after Hindlimb Unloading and Reloading
Litvinova, K. S.; Tarakin, P. M.; Larina, I. M.; Shenkman, B. S.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-89 - P-90; In English; See also 20070022623
Contract(s)/Grant(s): RFBR-04-04-48757; RFBR-05-04-08200-ofi-a; Copyright; Avail.: Other Sources

Muscles atrophy understood as muscle mass reduction is a natural and constant consequence of exposure of mammals to gravitational unloading. This reduction is accompanied by the decrease of whole muscle and single fiber contractile properties. After 7 day reloading after 3 week exposure to hindlimb suspension evoked peak tension of isolated soleus was observed to exceed significantly that of the unloaded muscle. We did not succeed in finding data in literature on contractile properties of single skinned fibers stimulated by exogenous calcium concentration increase during reloading after 2-4-week hindlimb suspension. However 7 days after hind limb suspension as a rule 50% recovery of slow- and fast-twitch soleus fiber

cross-sectional area is observed on frozen sections stained with myofibrillar ATPase or with antibodies against slow and fast myosin heavy chain isoforms. Atrophy development in a muscle is usually considered to account for proteolysis enhancement as well as inhibition of synthesis of myofibrillar proteins. At the same time little is known about unloading and reloading effects on one of the most important growth factors I (IGF-1), that is considered to be the main intracellular triggering stimulus for protein kinase B - mTOR>> signalling pathway activation. At the present nothing is known about changes in its serum concentration during reloading though the known mechanism of its activity is associated with sarcolemmal receptors activation. So our study was purposed to investigate: (i) alterations of isolated soleus skinned fiber contractile properties during gravitational unfoading and reloading; (ii) changes of soleus fiber sizes on frozen sections and on skinned preparations after gravitational unloading and reloading; (iii) changes of muscle fiber characteristics in relation to changes of serum IGF-1 levels.
Derived from text
Atrophy; Hindlimb Suspension; Rats; Serums; Muscle Fibers

20070022676 Osaka Univ., Toyonaka, Japan
Effects of Tenotomy and/or Denervation on the Characteristics of Plantaris Muscle Fibers of MDX Mice
Higo, Yoko; Terada, Mashiro; Umemoto, Shiori; Kawabe, Naoko; Kawano, Fuminori; Ohira, Yoshinobu; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-87 - P-88; In English; See also 20070022623
Contract(s)/Grant(s): JSPS-15200049; JSPS-15700417; MOH-16B-2; Copyright; Avail.: Other Sources

Effects of tenotomy (T) and/or denervation (D) on the degeneration/regeneration of plantaris muscle fibers were studied in wild type (WT) and muscular dystrophic (mdx) mice. Distal tendons of the left plantarflexors were ablated in the T group. The sciatic nerve of the left limb was transected at the gluteal region for D. The contralateral side was kept intact. After 2-wk ambulation, plantaris muscles were sampled bilaterally. Myosin heavy chain (MHC) expression and the distribution of myonuclei were analyzed in the serial cross-sections. The total fiber number was similar between two groups. The percent distribution of the central-nucleated fibers was over 50% in the mdx mice, although few fibers contained the central-nuclei in the WT mice. The number and percent distribution of the central-nucleated fibers were not affected by T, D, or T+D in both mice. Plantaris was predominately composed of the fibers expressing only type II MHC (69%-100%) in both mice. The cross-sectional area of the muscle fibers was significantly decreased following T, D, or T+D. The magnitude of the response was similar between WT and mdx mice.
Author
Mice; Muscle Fibers; Tendons; Degeneration; Necrosis; Nerves

20070022677 National Academy of Science of the Ukraine, Kiev, Ukraine
Histochemical Research of Brassica Rapa Embryos at the Different Stages of Development under Clinorotation
Popova, A. F.; Ivanenko, G. F.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-103 - P-104; In English; See also 20070022623; Copyright; Avail.: Other Sources

The accumulation of polysaccharides, proteins and lipids in Brassica rapa embryos at the different stages of their development, generated under clinorotation and in the laboratory control was studied. Some differences in dynamic of reserve substance accumulation were revealed between above-mentioned variants. Under clinorotation statistically significant data in starch and lipid quantity in the cells of external integument and in the embryos was detected. The changes in protein patterns of ovules and embryos, and an appearance of new bands in the region of 43 kDa and 70 kDa were established under clinorotation. Obtained results may indicate the decrease of biosynthesis processes, and/or also a certain inhibition of trophic function of the embryos under altered gravity.
Author
Biosynthesis; Clinorotation; Embryos; Histochemical Analysis; Plants (Botany)

20070022678 Texas Univ. Health Science Center, Houston, TX, USA
Human Bone-Forming Chondrocytes Cultured in the Hydrodynamic Focusing Bioreactor Retain Matrix Proteins: Similarities to Spaceflight Results
Duke, P. J.; Hecht, J.; Montufar-Solis, D.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-93 - P-94; In English; See also 20070022623
Contract(s)/Grant(s): NCC9-142; 15955-JTH; Copyright; Avail.: Other Sources

Fracture healing, crucial to a successful Mars mission, involves formation of a cartilaginous fracture callus which differentiates, mineralizes, ossifies and remodels via the endochondral process. Studies of spaceflown and tailsuspended rats

found that, without loading, fracture callus formation and cartilage differentiation within the callus were minimal. We found delayed differentiation of chondrocytes within the rat growth plate on Cosmos 1887, 2044, and Spacelab 3. In the current study, differentiation of human bone-forming chondrocytes cultured in the hydrodynamic focusing bioreactor (HFB) was assessed. Human costochondral chondrocytes in suspension were aggregated overnight, then cultured in the HFB for 25 days. Collagen Type II, aggrecan and unsulfated chondroitin were found extracellularly and chondroitin sulfates 4 and 6 within the cell. Lack of secretion was also found in pancreatic cells of spaceflown rats, and in our SL3 studies. The HFB can be used to study cartilage differentiation in simulated microgravity.
Author
Bioreactors; Space Flight; Osteogenesis; Cell Culturing; Hydrodynamics; Proteins; Cartilage

20070022679 Semmelweis Univ. Medical School, Budapest, Hungary
3D Reconstruction in the Cerebellar Cortex as an Effective Tool to Investigate Neuronal Plasticity
Simon, Laszlo; Konig, Marton; Noszek, Annamaria; Garab, Sandor; Takacs, Jozsef; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-17-P-18; In English; See also 20070022623; Copyright; Avail.: Other Sources

The cerebellar Purkinje cell (Pc) is one of the earliest appearing neurons in the cerebellar cortex. The birthdate of these neurons is between 12-15 days of embryonic life in rodents. The normal postnatal development ends by day 21. Prae- and perinatal development of the cerebellar cortical cytoarchitecture can be disturbed and/or damaged by exo- and endogenous noxious agents. Systemic administration of 5-bromo-2'-deoxyuridine (BrdU, 50 microg/g b.w.) at P0-P6 and P0-P12 postnatal ages resulted in a serious cerebellar cortical impairment. Depending upon the applied BrdU dose a proportion of granule cells dies, while Purkinje cells are unable to settle into a characteristic monolayer. Unusual morphology of developing Purkinje cells were observed, containing giant vacuoles in their cytoplasm. These cells, at the same time, built up seemingly normal synapses with parallel and climbing fibers. Atypic Purkinje cells were mainly observed in the IX. lobe of vermis on postnatal 5-8th days. In a smaller population of Pc-s, signs of severe degradation appeared. 3D reconstruction of these cells and of the neighbouring cortical structure was performed on 0,75 micrometer serial sections. Consecutive picture pairs were optimally aligned by our automatic computer program. Aiming the better understanding of the above peculiar phenomena, rotating 3D display revealed that atypic Pc-s mainly appeared in close vicinity of capillaries, suggesting also the possibility of an anusual mechanism of development.
Author
Cerebellum; Cerebral Cortex; Neurons; Cytology; Plastic Properties; Image Reconstruction

20070022680 Osaka Univ., Osaka, Japan
Impaired Spatial Learning after Hypergravity Load in Rats
Mitani, Kenji; Horii, Arata; Masumura, Chisako; Kitahara, Tadashi; Kubo, Takeshi; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-19 - P-20; In English; See also 20070022623; Original contains black and white illustrations; Copyright; Avail.: Other Sources

We attempted to elucidate the role of constant gravity in spatial learning using a radial arm maze on rats housed in a hypergravity environment produced by a centrifuge device. The rats were kept in 2G linear acceleration for 2 weeks and the spatial learning task was performed for 10 days. The control rats were placed close to the centrifuge device. The results showed that accuracy was significantly lower and the re-entry rate was significantly higher in the HG rats than in the controls, indicating that spatial learning was impaired in the HG rats. Locomotor activity was higher in the HG rats and there was no difference in number of baits per minute. In conclusion, increased locomotor activity subsidized the impairment of spatial cognition due to hypergravity exposure.
Author
High Gravity Environments; Loads (Forces); Rats; Attitude (Inclination); Disorientation; Maze Learning; Impairment

20070022681 Politecnico di Milano, Milan, Italy
Evaluation of Changes in Left Ventricular Early Diastolic Mitral Annular Velocity during Parabolic Flight Using Tissue Doppler Echocardiography
Caiani, E. G.; Takeuchi, M.; Weinert, L.; Capderou, A.; Vaida, P.; Lang, R. M.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-165 - P-166; In English; See also 20070022623; Copyright; Avail.: Other Sources

We utilized parabolic flight to test the preload independence of early diastolic mitral annular velocity (E') measured by Tissue Doppler echocardiography (TDE). TDE images were obtained (S5, Philips iE33) during normogravity (lG), hypergravity (1.8G), and microgravity (OG) from the apical 4-chamber view in 10 normal subjects (age 38 +/- 11 yrs) in

upright position. For each gravity, E was measured and averaged over three beats from the myocardial velocity curves computed in the basal inter-ventricular septum (IVS) and lateral (LAT) segments. At OG, E' increased (p<0.0l) compared to 1G (IVS: from 3.45 +/- 0.98 cm/s at 1G to 6.45 +/- 1.62 cm/s at 0G; LAT: from 2.72 +/- 0.96 cm/s to 5.05 +/- 1.97 cms), while at 1.8G E was reduced (IVS: 3.42 +/- 1.68 cm/s; LAT: 2.15 +/- l.61 cm/s). E' is not a preload independent index; this should be considered in clinical practice.
Author
Diastole; Cardiovascular System; Cardiac Ventricles; Cardiology; Heart Function

20070022682 Toyama Univ., Toyama, Japan
Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana
Tamaoki, Daisuke; Karahara, Ichirou; Nishiuchi, Takumi; Wakasugi, Tatsuya; Yamada, Kyoji; Yamaguchi, Kazuo; Kamisaka, Seiichiro; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-101 - P-102; In English; See also 20070022623; Copyright; Avail.: Other Sources

Deposition of lignin in secondary cell walls has been considered to be essential for the evolution of land plants. In this study, we examined the effects of hypergravity conditions on lignin deposition in secondary cell walls of Arabidopsis inflorescence stems. The content of lignin in a secondary cell wall fraction was significantly increased by hypergravity stimulus. Microarray analysis (22K) was used to identify genes that are modulated in expression in response to hypergravity conditions. The data showed that many genes putatively involved in lignin biosynthesis were expressed more than 2-fold by hypergravity treatment. Our data suggest that hypergravity-induced increase in the lignin content is attributed to increase in the expression level of genes involved in lignin synthesis under hypergravity conditions.
Author
Biosynthesis; Cells (Biology); Genes; High Gravity Environments; Lignin; Plants (Botany); Gravitational Effects

20070022683 Academy of Sciences (Russia), Moscow, Russian Federation
The Eye Pursuit Function during Dry Immersion with and without a Compensator of Support Unloading
Kornilova, L. N.; Alekhina, M. I.; Temnikova, V. V.; Sagalovich, S. V.; Naumov, I. A.; Kozlovskaya, I. B.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-25 - P-26; In English; See also 20070022623; Copyright; Avail.: Other Sources

The eye pursuit function of moving stimuli horizontally and vertically was investigated in condition of 7-day dry immersion (DI). The study was performed before DI, on days 1 and 5 of the DI, on days 1 and 3 after DI in I8 subjects (in 9 with a compensator of support unloading (CSU)). During DI in the group without CSU there were marked individual multidirectional (a decrease and an increase) changes in the parameters of visual pursuit. In the group with CSU these parameters in some subjects remained at the baseline level; other subjects responded to additional support afferentation in different ways. None-the-less, CSU made eye pursuit more stable and less variable. The marked individual responses of eye pursuit indicated a varying role and contribution of support input in various subjects during formation of visual pursuit.
Author
Eye (Anatomy); Submerging; Ophthalmology; Eye Movements; Visual Tasks

20070022684 Tokyo Medical and Dental Univ., Japan
Neuronal Activities in Rat Limbic System during Parabolic Flight
Kumei, Yasuhiro; Zeredo, Jorge; Ikeda, Tohru; Kimoto, Mari; Ogasawara, Masahiro; Fukushima, Genzo; Suzuki, Hiromi; Fujishima, Thoru; Toda, Kazuo; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-27 - P-28; In English; See also 20070022623; Copyright; Avail.: Other Sources

We first report the unit activities of limbic system during aircraft parabolic flights by telemetric measurement through chronically implanted recording electrodes in the hippocampus, hypothalamus, dentate gyrus, and amygdala of freely moving rats. The flight was conducted for three continuous days. Data were obtained from five times parabora exposures to microgravity (0.1 G or under) for 10 seconds. Rat behavior was monitored throughout the flight by video camera. Rats were calm throughout the flights. Only the hind limbs were floated 10 cm above the cage bottom upon the sharp decrease of gravitational force. The firng frequencies of hypothalamus were significantly increased within one second upon microgravity exposure, however, not significantly changed in the hippocampus, dentate gyrus, and amygdala. Hypothalamus might be the primarily sensitive site in the rat limbic system that responds to gravity alteration. Immediate action of neuronal activities may explain the mechanisms underlying the stress-response to gravity change.
Author
Neurophysiology; Rats; Hippocampus; Weightlessness; Gravitational Effects; Gravitational Physiology; Physiological Effects

20070022685 Fourth Military Medical Univ., Xi'an, China

Changes of Mechanotransduction in MG-63 Osteosarcoma Cells Induced by Simulated Weightlessness

Wang, Pan; Zhang, Shu; Wang, Bing; Sun, Xi-Qing; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-143 - P-144; In English; See also 20070022623

Contract(s)/Grant(s): NNSF-30300398; Copyright; Avail.: Other Sources

This study was aimed to explore the role of Shc(raised dot)Grb2(raised dot)Sos in MG-63 osteosarcoma cells mechanotransduction and to survey the functional alteration of Shc(raised dot)Grb2(raised dot)Sos in simulated weightlessness. Immunoprecipitation and Immunoblotting were used to examine the effects of 1 h fluid shear stress (FSS) on the induction of Shc(raised dot)Grb2(raised dot)Sos, by the MG-63 osteosarcoma cells cultured 60 h in two different gravitational environments, i.e. 1 G terrestrial gravitational condition and simulated weightlessness condition. MG-63 cells cultured in lG condition reacted to FSS treatment with an enhanced amount of Grb2 or Sos co-immunoprecipitated with Shc. The response reached measurable stimulation values within 1 min after onset of flow and reached highest values in 15 min. Stimulation continued throughout the 1 h FSS treatment period. As to the MG-63 cells cultured in simulated weightlessness by using clinostat, mechanical stimulation by 1.5 Pa FSS resulted, after 15 min, in increased amount of Grb2 or Sos co-immunoprecipitated with Shc. And stimulation continued throughout the next 45- minute 1.5 Pa FSS treatment period. These results suggested that FSS induced a sustained association of Shc with the Grb2(raised dot)Sos complex. And mechanotransduction in MG-63 cells was affected by simulated weightlessness.

Author

Histochemical Analysis; Immunology; Weightlessness Simulation; Osteoblasts; Mechanics (Physics)

20070022686 Fourth Military Medical Univ., Xi'an, China

Effect of Simulated Weightlessness on the Expression of CBF 1 Induced by Fluid Shear Stress in MG-63 Osteosarcoma Cells

Yang, Zhi; Zhang, Shu; Wang, Bing; Sun, Xi-Qing; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-145 - P-146; In English; See also 20070022623

Contract(s)/Grant(s): NNSF-30300398; Copyright; Avail.: Other Sources

This study was aim to explore the effect of flow shear stress on the expression of Cbfa1 in human osteosarcoma cells and to survey its functional alteration in simulated weightlessness. After cultured for 48 h in two different gravitational environments, human osteosarcoma cells (MG63) were treated with fluid shear stress (FSS) in a flow chamber. Rt-PCR analysis was made to examine the gene expression of Cbfal. The expression of Cbfa1 protein was detected by means of Western Blotting. Compared with no FSS control group, Cbfa1 mRNA and protein expression increased significantly at 30 and 60 min with the treatment of FSS (P less than 0.01). As to the osteoblasts cultured in simulated weightlessness by using clinostat, the expression of Cbfal was significantly different between 1G and simulated weightlessness conditions at each test time (P less than 0.05). Compared with no FSS control group cultured in simulated weightlessness, Cbfal mRNA and protein expression increased significantly at 30 and 60 min with the treatment of FSS (P less than 0.05). FSS can significantly increase the gene and protein expression of Cbfal in human osteosarcoma cells. And this inducible function of FSS was affected by simulated weightlessness.

Author

Osteoblasts; Shear Stress; Weightlessness Simulation; Fluids; Gene Expression; Cell Culturing

20070022687 Institute of Aviation Medicine, Prague, Czechoslovakia

Testing Methods of Push-Pull Effect

Dosel, P.; Hanousek, J.; Petricek, J.; Cettl, L.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-171-P-172; In English; See also 20070022623; Original contains black and white illustrations; Copyright; Avail.: Other Sources

Flight specificity of modern agile aircrafts involves sustained G load, high acceleration onset and its vectors alteration. Thus the push-pull effect makes a particular significance. Lower Body Negative Pressure (LBNP) simulator was adapted to be used to induce that effect. A group of 44 Czech Air Force pilots was examined by means of this setup. The method promises to be useful in assessing push-pull resistance. However some changes to LBNP set up have to be accomplished to gain stronger push-pull effect.

Author

Flight Tests; High Speed; Simulators

20070022688 Kyoto Univ., Japan

Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery

Matsumoto, Akike; Kawano, Fuminori; Higashibata, Akira; Ishioka, Noriaki; Shimazu, Toru; Ohira, Yoshinobu; Ishihara, Akihiko; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. 11-12; In English; See also 20070022623; Copyright; Avail.: Other Sources

The cell body sizes and succinate dehydrogenase (SDH) activities of motoneurons in the dorsolateral region of the ventral horn at the cervical and lumbar segments in the rat spinal cord were determined following 9 days of spaceflight with or without 10 days of recovery on Earth. The SDH activity of medium-sized motoneurons in the lumbar segment decreased following spaceflight. In addition, the decreased SDH activity of medium-sized motoneurons persisted for at least 10 days of recovery on Earth. It is concluded that spaceflight selectively affects the SDH activity of medium-sized motoneurons in the lumbar segment of the spinal cord.

Author

Lumbar Region; Muscular Function; Neurons; Space Flight; Spinal Cord; Physiological Effects; Biological Effects

20070022689 National Inst. of Occupational Safety and Health, Kawasaki, Japan

Reduction of Body Response after 2G Load by Slow Acceleration

Ueno, Satoru; Tai, Testuo; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-13 - P-14; In English; See also 20070022623; Copyright; Avail.: Other Sources

To investigate the effects on rats of slow acceleration to 2G, we spent 2 days to increase the gravity to 2G automatically and measured body temperature, activity, food intake of rats. In slowly accelerated hypergravity exposure, the deep body temperature (DBT) of rats decreased to 35.8 +/- 0.2 deg. C (n = 6). Rats recovered their DBT level within a day and circadian rhythm gradually. When the gravity increased to 2G in a few minutes, DBT dropped to 34.+/- 0.3 deg. C (n=6) within an hour. Initial temperature drop after hypergravity exposure were alleviated by slow acceleration. It took more time for rats to recover its DBT level and circadian rhythm than slowly accelerated rats. Activity and food intake measured every minute also decreased and lost its circadian rhythm after hypergravity load in both conditions. Alleviation of hypergravity response suggested that rats got higher +G(sub x) tolerance during slow acceleration.

Author

Body Temperature; Gravitation; High Gravity Environments; Gravitational Physiology; Physiological Responses; Gravitational Effects; Aerospace Medicine

20070022690 Kagoshima Univ., Japan

Change of Bone Mineral and Morphology in Growing Rat Leg Bone after Hindlimb Unloading

Majima, Hideyuki, J.; Iwashita, Yoichiro; Higashibata, Akira; Ishioka, Noriaki; Ohira, Yoshinobu; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-91 - P-92; In English; See also 20070022623; Copyright; Avail.: Other Sources

Changes of bone mineral content (BMC) or density (BMD) as well as morphology after the hind-limb unloading and during reloading were studied in 4-day old Wister rat. The hindlimb suspension (HS) was performed for 3 months, thereafter recovery was allowed for up to 3 months. The 3 month HS resulted in a curving in L-M direction of tibia compared to the control. The BMC and BMD were significantly lower than in the control group at the end of HS period. BMD of the tibia increased but remained significantly lower than the control group throughout 3 month recovery period, although BMC and radius of the fibula and shape of tibia returned to the control level.

Author

Bone Mineral Content; Hindlimb Suspension; Morphology; Rats; Leg (Anatomy)

20070022692 Genoa Univ., Genoa, Italy

Effects of Modeled Microgravity on Rat Testis

Uva, B. M.; Strollo, F.; Ricci, F.; Pastorino, M.; Prato, P.; Masini, M. A.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-131 - P-132; In Italian; See also 20070022623; Copyright; Avail.: Other Sources

Rat testes and rat testes'slices were subjected to modeled microgravity (microg) using a three dimensional Random Positioning Machine for 30' and lh. At the end of the rotations the specimens were fixed with Immunofix. 5 micron sections were processed for histological analysis, immunohistochemical identification of (i) microtubules (a-tubulin), (ii) 38 hydroxysteroid dehydrogenase (3PHSD), (iii) 170 hydroxysteroid dehydrogenase (17PHSD}, iv) caspase 7, (v) heat shock

proteins (HSPs) and identification of DNA fragmentation. At 3' at modeled microg the histology of the testes was altered, microtubules were disorganized, germ cell division was reduced and few spermatocytes reached the stage of spermatids. Numerous primary spermatocytes underwent apoptosis. Immunostaining for 3PHSD diminished in the Leydig cells, while immunostaining for 17PHSD was abolished. At 1 h in modeled pg HSPs were expressed and steroidogenic enzymes were again iminunostable. These data show that microg per se causes loss of spermatogenesis and steroidogenesis.
Author
Gametocytes; Histology; Microgravity; Rats; Spermatogenesis; Testes; Gravitational Effects; Gravitational Physiology

20070022693 Central Clinical Hospital, Moscow, Russia
Effect of the Lower Body Negative Pressure (LBNP) Test on the Mirocirculation of Healthy Volunteers and Patients with Coronary Artery Disease
Gurfinkel, Yury I.; Mikhailov, Valery M.; Ushakov, Boris B.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-41 - P-42; In English; See also 20070022623; Copyright; Avail.: Other Sources

Applying computer capillaroscopy during LBNP test has allowed separately estimating a capillary blood velocity (CBV) in arterial and venous segment of capillaries. Coefficient Kv represents the ratio of CBV in an arterial segment to CBV in venous segment of a capillary. The obtained results revealed that microcirculation parameters of healthy volunteers and patients with CAD, and also patients with hypertension differently react to the negative pressure produced in the lower part of body.
Author
Coronary Artery Disease; Lower Body Negative Pressure; Capillaries (Anatomy); Cardiovascular System

20070022694 Academy of Sciences (Russia), Moscow, Russian Federation
Resting Intracellular Calcium Level as a Triggering Signal for Soleus Fiber Alterations during Unloading
Shenkman, B. S.; Mukhina, A. M.; Litvinova, K. S.; Altaeva, E. G.; Nemirovskaya, T. L.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-73 - P-74; In English; See also 20070022623
Contract(s)/Grant(s): RFBR-N05-04-49255a; RFBR-04-04-49044; RFBR-05-04-08200; FAS-N02.467.11.3005; Copyright; Avail.: Other Sources

It is known, that under gravitational unloading elevation of resting calcium level in soleus fibers takes place. Some authors believe that calcium accumulation under gravitational unloading could be a triggering mechanism for muscle atrophy development and alteration of protein isoform distribution. To verify this hypothesis we performed several studies. Our studies with 14 days of Ca(2+) chelator (EGTA) administration (according to protocol of Duan et al, 1990) in hindlimb unweighted rats demonstrated that the artificial reduction of the intracellular Ca(2+) level completely prevented the decrease in Ca(2+) sensitivity of skinned fibers, slow-to-fast shift of fiber types and attenuated the 3040% degradation of titin and nebulin and alterations of subsarcolemmal dystrophin layer (Litvinova et a], 2005, Shenkman et al, 2005). In the next experiment we tried to determine the way of Ca(2+) entry into the fibers during rat hind limb suspension. To prevent Ca(2+) entry inside the fiber we conducted specific blocking of L-type calcium channels by means of nifedipine. It was found that blocking of L-type calcium channels allowed to decrease myoplasmic concentration of calcium ions and accordingly to prevent development of myosin heavy chain changes, NFATcl nuclear translocation and SERCA isoform redistribution.
Author
Calcium; Muscle Fibers; Hindlimb Suspension; Histochemical Analysis; Immunology; Cells (Biology)

20070022695 Nagoya Univ., Nagoya, Japan
Unilateral Lower Limb Suspension Induced Atrophy as a Model of Unweighting
Akima, Hiroshi; Hotta, Norio; Sato, Kohei; Katayama, Keisho; Ishida, Koji; Iwase, Satoshi; Fukunaga, Tetsuo; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-75 - P-76; In English; See also 20070022623
Contract(s)/Grant(s): MOE-17300207; Copyright; Avail.: Other Sources

The purpose of this study was to investigate atrophy induced by unilateral lower limb suspension (ULLS) comparing with that by bed rest. Eight healthy men participated in ULLS study, and twenty healthy men participated in bed rest study. The subjects performed unilateral unloading for 20 days as described in Berg et al. (1991). The data of 20 days of bed rest subjects was derived from our previous studies. Magnetic resonance imaging-of the thigh and calf was taken to calculate volume of the knee extensors, knee flexors, adductors, and plantar flexors. The relative change of the muscle volume in the knee flexors showed significantly higher in bed rest than ULLS, however no significant difference was found in the volume of the knee

extensors, adductors, and plantar flexors. We concluded that ULLS has the similar atrophic pattern and degree in the most of lower limb muscle groups comparing with bed rest.
Author
Atrophy; Limbs (Anatomy); Bed Rest; Microgravity; Musculoskeletal System; Models

20070022696 NASA Ames Research Center, Moffett Field, CA, USA
Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005
Grigoryan, Elonora; Almeida, Eduardo; Domaratskaya, Elena; Poplinskaya, Valentina; Aleinikova, Karina; Tairbekov, Murad; Mitashov, Victor; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-189 - P-192; In English; See also 20070022623
Contract(s)/Grant(s): RFBR-04-04-48044; RFBR-05-04-48502; Copyright; Avail.: Other Sources

The experiments on the newts performed earlier aboard Russian biosatellites showed that the rate of lens and tail regeneration in space was greater than on the ground. In parallel it was found that the number of cells in S-phase was greater in space-flown animals than in the ground controls. However, it was unclear whether cell proliferation stimulation was induced by micro-g per se. Molecular mechanisms underlying the change also remained obscure. These issues were addressed by the joint Russian-American experiment 'Regeneration' flown on Foton-M2 in 2005. The method for in-flight delivering DNA precursor BrdU was developed. The experiment showed that during the flight the number of S-phase cells in the regenerating eyes and tails increased. These data together with those obtained earlier suggest that cell proliferation increases in response to the effects of both micro-g and 1-g after return to Earth. The expression of bFGF in regenerating tissues of 'flown' newts and ground controls was examined using immuno-histochemistry. Obtained results suggest that this growth factor is a participant of the promotional effect of space flight upon cell proliferation in lens and tail regenerates.
Author
Cells (Biology); Microgravity; Regeneration (Physiology); Amphibia; Weightlessness; Gravitational Effects; Gravitational Physiology; Physiological Effects

20070022697 NASA Ames Research Center, Moffett Field, CA, USA, GosNIIGenetika, Moscow, Russia
Influence of Space Flight Factors on the Genetic Properties of Streptomyces Lividans 66 (PIJ702)
Tabakov, V. Yu.; Voeikova, T. A.; Tairbekov, M. G.; Goins, T. L.; Martinson, V. G.; Pyle, B. H.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-181 - P-184; In English; See also 20070022623
Contract(s)/Grant(s): NCC2-1143; Copyright; Avail.: Other Sources

Gram-positive Streptomyces bacteria display genetic instability in response to external factors. Strain S. lividans 66 harbors the multicopy plasmid pIJ702 with selective and differential marker genes for antibiotic thiostrepton resistance and melanin production. Culture plates of modified ISP agar medium with and without thiostrepton were flown on Foton-M2. Suboptimal flight temperatures, which were simulated for asynchronous ground controls, resulted in slow growth and failure to differentiate and sporulate. Flight samples and asynchronous controls showed a high frequency of failing to express plasmid markers compared to laboratory controls. This was associated with loss of plasmid DNA and likely resulted from suboptimal temperatures for flight cultures and controls. Neither restriction fragment length polymorphism, nor polymerase chain reaction amplification coupled with denaturing gradient gel electrophoresis, revealed differences between pIJ702 DNA from flight vs. control clones. Mutations of the plasmid marker genes resulting from specific spaceflight factors, e.g., microgravity and radiation, were not detected.
Author
Bacteria; Deoxyribonucleic Acid; Genes; Microgravity; Weightlessness; Physiological Effects

20070022698 Osaka Univ., Toyonaka, Japan
Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice
Wang, Xiaodong; Kawano, Fuminori; Matsuoka, Yoshikazu; Terada, Masahiro; Yamamoto, Hiroshi; Ito, Tsunekata; Goto, Katsumasa; Lan, Yongbo; Ohira, Yoshinobu; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-77 - P-78; In English; See also 20070022623
Contract(s)/Grant(s): JSPS-15200049; MOE-15700417; MOH-16B-2; Copyright; Avail.: Other Sources

The osteopetrotic (op/op) mutant mouse has a reduced number of osteoclasts and is deficient in its monocyte and macrophage populations. The macrophage colony stimulating factor (M-CSF) presents the primary regulator of mononuclear phagocyte production in vivo and plays an essential role in the survival, proliferation, differentiation, and maturation of the macrophage myeloid lineage. The present study was carried out to investigate the role of the macrophage in the plasticity of

soleus muscle fibers of adult op/op (-/-), heterozygous (+/-), and wild type (+/+) mice. They were separated into control and unloaded groups. The mice in the unloaded group were hindlimb-suspended for 10 days. The half number of mice in the unloaded group was allowed to recover for 10 days after the termination of suspension. The sampling of soleus muscle was performed before suspension and immediately and 10 days after suspension. The fiber cross-sectional area (CSA), myonuclear number, and the number of quiescent and mitotic active satellite cells were measured in the single muscle fibers, which were isolated from tendon to tendon by collagen digestion. The mean fiber length in -/- mice was shorter than +/+ and +/- mice in control and suspension groups, suggesting that inhibition of muscle growth in -/- mice is closely associated with the shorter bone length. The fiber CSA was decreased by unloading in +/+, +/-, and -/- mice. However, the CSA in -/- mice did not recover following 10 days of reloading, whereas the CSA in +/+ and +/- mice was increased to the control level. Such irreversible effects were also observed in the myonuclear number and the number of quiescent and mitotic active satellite cells in -/- mice. It is suggested that the characteristics of soleus muscle fibers are closely associated with the level of gravitational loading, and that the macrophage plays one of the key roles in the regulation of muscle fiber plasticity.
Author
Macrophages; Muscle Fibers; Muscles; Regeneration (Physiology); Gravitational Physiology; Gravitational Effects; Physiological Effects; Mice

20070022699 Pune Univ., India
Effect of Gravity on the Cardiovascular System
Santosh, B.; Sabnis, S. M.; Razia, R. N.; Vidyasagar, P. B.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-35 - P-36; In English; See also 20070022623; Copyright; Avail.: Other Sources

The aim of the study was to acquire and analyse data on the changes in ECG/EKG, heart rate and blood pressure with the change in gravitational acceleration or g. The subjects were attached to a platform which could be rotated from 0' to 90' and were then rotated in steps of 15' upto 90' and back to 0' in two directions from 0" (supine position) to 90' (upright position) and 0' (supine position) to -90' (upside position). Data viz., ECG/EKG, heart rate and blood pressure were acquired for each position. All the subjects were healthy males in the age group of 19-25. The subjects were divided in two groups. One group consisted of those who regularly practiced Sheersasana (which is a Yogic posture wherein the person stands upside down balancing on the hands) till the past two years while the other group had never practiced Sheersasana and was taken as control group. The results were plotted in the form of histograms for the differences in heart rate, systolic blood pressure, diastolic blood pressure and pulse pressure between two consecutive positions. The normal group showed a comparatively large spread than those in the Sheersasana group. This suggests that regular practice of Sheersasana might possibly tune the cardiovascular system to the pooling of the blood in the head as in microgravity conditions.
Author
Cardiovascular System; Gravitational Effects; Microgravity; Gravitational Physiology; Physiological Effects; Physiological Responses

20070022700 CHU Tours, Hospital, France
Effect of Abdominal or Lower Limb Muscle, Isometric Contraction during Stand Test, on the Portal Venous and Femoral and Cerebral Arterial Hemodynamics
Besnard, S.; Kerbeci, P.; Arbeille, Ph.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-45 - P-46; In English; See also 20070022623; Copyright; Avail.: Other Sources

The objective was to quantify the Portal vein as well as the Cerebral, and Femoral arteries hemodynamic changes induced by lower limb or abdominal isometric contractions of I min, during a Tilt test. Method: 9 healthy volunteers undergo, a Tilt up test with: 2 rnin simply standing, 1 min with lower limb isometric contraction, and 1 min with abdominal contraction. Portal vein and peripheral arteries were assessed by Echography and Doppler. Results: During leg contraction: BP and HR increased (10 to 15%). The Femoral resistance dropped by 235% and the flow increased by +229% from Tilt. The Cerebral flow and Portal vein section remained stable. During abdominal contraction: BP and HR increased by 10 to 15%. The Femoral resistance and flow velocity remained stable at Tilt level. The portal vein reduced less (-29%) compare to tilt (-36%). The Cerebral flow remained stable. Conclusion: Each maneuver induce significant local hemodynamic changes that could contribute to the cardiac output redistribution in response to orthostatic tests.
Author
Blood Flow; Brain Circulation; Hemodynamic Responses; Muscular Function; Blood Circulation; Gravitational Physiology

20070022701 Fourth Military Medical Univ., Xi'an, China

Effects of Intermittent Head-Up Tilt on Endothelin Expression and Morphological Changes of Artery during Simulated Weightlessness in Rabbits

Sun, Xi-Qing; Wang, Bing; Sun, Hui-Pin; Yao, Yong-Jie; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-47 - P-48; In English; See also 20070022623; Copyright; Avail.: Other Sources

The adaptive change of cardiovascular system is one of the factors of orthostatic intolerance after space flight. The purpose of this study was to observe the effects of intermittent 45' head-up-tilt (HUT) on the endothelin (ET-1) expression and morphological changes of femoral artery and carotid artery in rabbits during 21 days simulated weightlessness. Twenty-four rabbits were randomly divided into control, simulated weightlessness and countermeasure groups, 8 rabbits in each group. The simulated weightlessness group kept head-down tilt (HDT) for 21 days. The countermeasure group kept 45' HUT for 2 h every day during 21 days HDT. After 21 days experiment, the structure of femoral artery and carotid artery were studied and ET-1 expression were tested by immunohistochemical method. Some of the endothelial cells of femora1 artery fell off and the smooth muscle cells were necrotic in the simulated weightlessness group, and the vasal wall became thinner. While the endothelial cells of carotid artery were hyperplastic and internal elastic lamina got thickened. No significant changes were observed in femoral artery and carotid artery in the countermeasure group. The ET-1 expression was decreased in femoral artery while increased in carotid artery in the simulated weightlessness group, but has no significant change in femoral artery and carotid artery in the countermeasure group, compared with the control group. Twenty-one days simulated weightlessness may induce an atrophic change and decreased ET-1 expression in femoral artery, and hyperplastic change and increased ET-1 expression in carotid artery in rabbits. Daily 2h 45' HUT may partly counteract the changes of femoral artery and carotid artery induced by simulated weightlessness.

Author

Cardiovascular System; Head Up Tilt; Weightlessness; Gravitational Effects; Microgravity; Gravitational Physiology; Physiological Effects

20070022702 Waterloo Univ., Ontario, Canada

WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP

Hughson, R. L.; Shoemaker, J. K.; Hargens, A. R.; Mattar, L.; Edgell, H.; Kerbeci, P.; Arbeille, Ph.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-39 - P-40; In English; See also 20070022623; Copyright; Avail.: Other Sources

Sixteen women were studied before, during and after a 60 day, continuous 6' head-down bed-rest (HDBR). Subjects were randomly assigned to two groups: Control (no countermeasures) and Exercise+LBNP (supine running within an LBNP chamber for 40-min followed by 10-min passive LBNP for 3-4 days/week, plus flywheel resistive training of the legs every third day). Cardiovascular responses were observed before bed rest, on day 50 of HDBR and R+8 after bed rest. Subjects were supine in the LBNP device with suction applied at 0, -10, -20 and -30 mmHg LBNP for 2-min per stage. In the pre-bed rest testing, there was no difference in HR between the groups at rest or at -30 mmHg. On HDBR day 50, HR was elevated at supine rest for the Con not the Ex group, while at -30 mmHg HR was elevated above pre-HDBR for both groups, but the magnitude of increase from Pre- to HDBR day 50 was less for the Ex group than for the Con group. The change in HR on HDBR day 50 is an important indicator as it was less than 24-hours after the Exercise+LBNP countermeasure on day 49. After bed rest, no specific countermeasures were provided in the first week, so HR responses on day R+8 reflected the effects of bed rest with or without countermeasure plus any recovery from simply returning to the upright posture. Relative to the Pre-bed rest responses, HR on day R+8 had recovered in the Ex group but was still elevated in the Con group. These results indicate that the cardiovascular response to LBNP is preserved to a greater degree during bed rest by the countermeasures, and further that the cardiovascular response returned to pre-bed rest much more rapidly in the Exercise+LBNP group than hi the group that received no cardiovascular countermeasures.

Author

Bed Rest; Cardiovascular System; Females; Heart Function; Heart Rate; Lower Body Negative Pressure; Physical Exercise; Gravitational Effects

20070022703 Academic Center for Dentistry, Amsterdam, Netherlands

Microrheology of Mechanosensitive Bone Cells

Bacabac, R. G.; Mizuno, D.; Schmidt, C. F.; MacKintosh, F. C.; Smit, Theo H.; vanLoon, J. J. W. A.; Klein-Nulend, J.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-135 - P-136; In English; See also 20070022623

Contract(s)/Grant(s): MG-055; MG-057; Copyright; Avail.: Other Sources

Metabolic processes involved in cellular mechanical activity and mechanosensing, as well as gravisensing, might be

understood by providing a physical portrait of cellular mechanical properties. Thus, we investigated the viscoelasticity, force traction, and external force fluctuations of round suspended bone cells using our two-particle microrheology assay. Fibronectin-coated spheres were optically maneuvered to trap a single cell between these two spheres, to which the cell attached. The complex compliance of the cell was measured by perturbing one of the probes (active mode) and by monitoring the fluctuations of the attached probes (passive mode). We found that bone cells exhibited an elastic plateau < 15 Hz, and viscoelastic stiffening > 100 Hz. The cellular force fluctuation, calculated from the cellular compliance was found proportional to omega (exp 2) (frequency = omega/2 pi), which characterizes non-thermal related activity by cells.
Author
Bones; Cytology; Rheology; Cells (Biology); Osteogenesis

20070022704 Academy of Sciences of the Ukraine, Kiev, Ukraine
Ground-Based Hypergravity Simulated Modeling Changed the Effects of the Glutamate Transporter Inhibitor on the Carrier-Mediated Glutamate Release in Low [Na+] Media from Rat Brain Nerve Terminals
Tatiana, Borisova; Natalia, Krisanova; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-137 - P-138; In English; See also 20070022623; Copyright; Avail.: Other Sources

The effects of Na+ concentration and competitive nontransportable inhibitor DL-threo-beta-benzyloxyaspartate (DL-TBOA) on the unstimulated and depolarization-evoked carrier-mediated release of L-[C-14]glutamate were evaluated under control and hypergravity conditions. The application of 10 micron DL-TBOA in low Na+ medium resulted in the increase in L-[C-14]glutamate release for control animals by 2.0 +/-.5 % of total accumulated synaptosmal label and 100 micron DL-TBOA - 3.0 +/-.5 %, respectively. The experimental data for hypergravity loaded animals showed 4.0 +/-1.0 % and 9.0 +/- 2.O %, (pr.0.05). The enhancement of the L-[C-14]glutamate release would be expected to connect with the inhibition of L-[C-14]glutamate reuptake process. It appears that after hypergravity loading DL-TBOA inhibited uptake more potently. The influence of DL-TBOA appeared to depend on a balance of the forward and reversed transport of L-[C-14]glutamate under control and hypergravity conditions. The effect of DL-TBOA on depolarization-induced L-[C-14]glutamate release increased after hypergravity loading in Na+- or low [Na+] supplemented media.
Author
Brain; Glutamates; High Gravity Environments; Nerves; Inhibitors; Biochemistry

20070022705 Fourth Military Medical Univ., Xi'an, China
Effects of Simulated Weightlessness on the Kinase Activity of MEKl Induced by BMP-2 in Rat Osteosarcoma Cells
Wang, Bing; Zhang, Shu; Wu, Yan-Hong; Wu, Xing-Yu; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-141 - P-142; In English; See also 20070022623; Copyright; Avail.: Other Sources

The mRNA expression of a1 chain of type I collagen (COL- I a 1) in ROS17/2.8 cells induced by BMP-2 was reduced under simulated microgravity. The protein kinase MEKl plays an important role in the expression of COL- I a 1 mRNA. The purpose of this study was to observe the effects of simulated weightlessness on the activity of MEKl induced by BMP-2 in ROS17/2.8 cells. ROS17/2.8 cells were cultured in 1G control and rotating clinostat simulated weightlessness for 24 h, 48 h and 72 h. BMP-2(500 ng/ml) was added into the medium 1 h before the culture ended. Then the total protein of cells was extracted and the kinase activity of MEKl was detected by means of Western blotting. There were no significani differences in the expression of total ERK1/2 among all groups. The expression of p-ERKl/2 was unconspicuous in the control group without BMP-2 but increased significantly when BMP-2 was added. The level of p-ERK1/2 in simulated weightlessness group was much more lower than that in 1G group in every time point. The kinase activity of MEKl induced by BMPZ in rat osteosarcoma cells was reduced under simulated weightlessness.
Author
Enzyme Activity; Rats; Weightlessness Simulation; Collagens; Bones; Proteins; Morphology; Osteoblasts

20070022706 University Hospital, Belgium
Heart Rate Reflexes and Arterial Pressure Control after Short-Duration Spaceflight
Verheyden, Bart; Beckers, Frank; Couckuyt, Kurt; Liu, Jiexin; Aubert, Andre E.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-59-P-60; In English; See also 20070022623; Original contains black and white illustrations; Copyright; Avail.: Other Sources

The purpose of this study was to investigate offsetting effects of heart rate (HR) on short-term fluctuations of arterial blood pressure (ABP) after 10-days spaceflight using spectral and transfer function analysis of RR-interval (RRI) and ABP fluctuations. A fixed breathing protocol was used to perturb autonomic cardiovascular function. Our data suggest that

spaceflight decreases vagal cardiac neural outflow and increases sympathetic influences on circulatory autonomic control. However, respiratory synchronous cardiac output- and ABP-changes remained unaffected. Therefore, postflight changes of autonomic cardiovascular rhythms appear to result from adequate baroreflex responses to altered hemodynamic loading conditions. Observed alterations are disappeared after 25 days.
Author
Hemodynamic Responses; Cardiovascular System; Heart Rate; Blood Pressure; Physiological Effects; Human Reactions; Aerospace Environments

20070022707 Florida Univ., Gainesville, FL, USA
Anesthesia during and Immediately after Spaceflight
Seubert, Christoph N.; Price, Catherine; Janelle, Gregory M.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-1-P-4; In English; See also 20070022623; Original contains black and white illustrations
Contract(s)/Grant(s): NNJ04HF74G; M01-RR00082; Copyright; Avail.: Other Sources

The increasing presence of humans in space and long-duration manned missions to the Moon or Mars pose novel challenges to the delivery of medical care. Even now, cumulative person-days in space exceed 80 years and preparations for a return to the Moon are actively underway. Medical care after an emergent de-orbit or an accident during a non-nominal landing must not only address the specific disease or injuries but also the challenges posed by physiologic adaptations to microgravity. In the highly autonomous situation of a long-term space mission the situation is even more complex, because personnel, equipment, specific training, and clinical experience are by definition limited. To summarize our current knowledge specifically for anesthetic care during and immediately after spaceflight, we will review physiologic adaptations to microgravity with particular emphasis on the resulting anesthetic risks, discuss veterinary experiences with anesthesia in weightlessness or in animals adapted to microgravity, describe current research that pertains to anesthesia and spaceflight and point out unresolved questions for future investigation.
Author
Anesthesia; Manned Space Flight; Long Duration Space Flight; Aerospace Medicine; Physiological Effects

20070022708 Gifu Univ., Gifu, Japan
Role of the Vestibular System in Arterial Pressure Response to Gravitational Stress
Morita, Hironobu; Gotoh, Taro M.; Matsuda, Tomoko; Abe, Chikara; Awazu, Chihiro; Tanaka, Kunihiko; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-5 - P-6; In English; See also 20070022623; Original contains black and white illustrations; Copyright; Avail.: Other Sources

To examine the role of vestibular and baroreflex system in maintaining arterial pressure (AP) during gravitational stress, 4 groups of conscious rats, which were either intact or had vestibular lesion (VL), sinoaortic denervation (SAD), or VL+SAD, were exposed to 3 G load with measuring AP and renal sympathetic nerve activity (RSNA). In VL+SAD rats in which neither reflex was functional, RSNA did not change, but the AP showed a significant decrease (-8 plus or minus 1 mmHg). In rats with a functional vestibulosympathetic reflex, but no baroreflex (SAD groups), marked increases in AP and RSNA were observed (+31 plus or minus 6 mmHg and +87 plus or minus 10 %), suggesting that the vestibulosympathetic reflex causes an increase in AP in response to gravitational stress; these marked increases were significantly attenuated by the baroreflex in the intact group (+9 plus or minus 2 mmHg and +38 plus or minus 7 %). In conclusion, AP is controlled by the combination of the baroreflex and vestibulosympathetic reflex. The vestibulosympathetic reflex elicits a huge pressor response during gravitational stress, preventing hypotension due to blood redistribution. In intact rats, this AP increase is compensated by the baroreflex, resulting in only a slight increase in AP.
Author
Arteries; Baroreflexes; Vestibules; Stress (Biology); Gravitational Effects; Cardiovascular System

20070022709 NASA Johnson Space Center, Houston, TX, USA
Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms
Almeida, E. A.; Roden, C.; Phillips, J. A.; Globus, R. K.; Searby, N.; Vercoutere, W.; Morey-Holton, E.; Gulimova, V.; Saveliev, S.; Tairbekov, M.; Iwaniec, U. T.; McNamra, A. J.; Turner, R. T.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-193 - P-196; In English; See also 20070022623
Contract(s)/Grant(s): NAG9-1458; Copyright; Avail.: Other Sources

Terrestrial organisms exposed to microgravity during spaceflight experience degeneration in bone, muscle, and possibly

other tissues that require gravity-mediated mechanical stimulation for normal regenerative growth. In the Gecko experiment aboard Foton M-2, we flew for the first time, five terrestrial Pachydactylus turneri specimens to develop a model of microgravity effects comparable to the newt Pleurodeles waltl, a well-established model organism for spaceflight. These lower vertebrate species have similar body plans and size, are poikilothermic, have tissue regenerative ability, and are adapted to moderate periods of fasting. Furthermore the gecko (Pachydactylus) can also survive prolonged periods without water. In pre-flight control experiments and after a 16-day Foton M-2 spaceflight without food or water, the geckos were recovered and showed no apparent negative health effects. However, detailed analysis of bone mass and architecture by micro Computed Tomography { pCT), showed that both synchronous control and spaceflight animals lost significant amounts of cancellous bone in the distal femur and humerus relative to basal controls. In addition, cell cycle analysis of 30h post-flight liver tissue reveals a shift of DNA content from G2 and S to G1, both in spaceflight and synchronous controls. Together, these results suggest that housing conditions alone induce rapid catabolism of cancellous bone and reduced normal tissue regeneration. Further use of the gecko Puchydactylus turneri as a spaceflight model requires modification of housing conditions, possibly by including water and food, or changing other factors such as eliminating housing stresses to obtain stable bone structure and tissue regeneration during spaceflight experiments.

Author

Animals; Microgravity; Vertebrates; Amphibia; Weightlessness; Gravitational Effects; Gravitational Physiology; Physiological Effects

20070022711 Institute of Human Morphology, Moscow, Russian Federation

Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846)

Gulimova, V. I.; Nikitin, V. B.; Asadchikov, V. E.; Buzmakov, A. V.; Okshtein, I. L.; Almeida, E. A. C.; Ilyin, E. A.; Tairbekov, M. G.; Saveliev, S. V.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-197 - P-200; In English; See also 20070022623; Original contains black and white illustrations; Copyright; Avail.: Other Sources

There are grounds to believe that space flown experiments on thick-toed geckos may help solve the problem of floatation of vertebrates in microgravity. Geckos of this species carry on the lower surface of their toes numerous setae, which allow them to remain attached to any surfaces regardless of the gravitational effects. Experiments were performed on 5 animals in each of the following groups: flight, basal, synchronous and laboratory controls. 32 hours after a 16- day flight the animals were euthanazed and examined using traditional histology and X-ray microtomography. Body mass losses were 10% in the flight animals, 7.4% in the synchronous controls, and 12.3% in the laboratory controls. Since the flight and synchronous animals were kept at 15-19 C, whereas the laboratory controls - at 26-28 C, it can be inferred that environmental temperatures impacted animal metabolism no less than flight induced stress. Blood tests of the flown animals showed a 12% decrease of erythrocytes and a 40% decrease of dark-nuclear granulocytes, with the number of light-nuclear granulocytes remaining unchanged. In the small intestine the number of goblet cells increased allowing them to occupy a large portion of the cyptal surface. Enhanced secretion was accompanied by the appearance of dead intestinal cells in the lumen. Clusters of degraded hepatocytes were found at the liver edges of flight animals. Signs of liver involution were similar to the changes produced by alcohol consumption but did not spread to its central part. In the heart, insignificant hypertrophy and excessive blood supply that still remained within the physiological norm were detected. No significant changes were found in the pancreas, lungs, nervous systems or the snouts of the flown animals, but the volume of their gallbladders was greater than in controls. The epithelium of toe pads of the flight animals became thinner. Histological examination of the humerus did not demonstrate significant mineral losses. However, X-ray microtomography showed changes in the trabecular structure in the subepyphyseal zone of bones in flight animals compared to the controls. In summary, all the changes detected in the flight animals were adaptive. Therefore, geckos of this species can be used as an animal model for morphological studies in longer-duration space flights.

Author

Gravitational Effects; Aerospace Environments; Bioastronautics; Physiological Effects; Lizards; Analogs

20070022713 Fourth Military Medical Univ., Xi'an, China

The Activity of Nitric Oxide Synthase may be Altered by Hindlimb Unweighting in Abdominal Aorta of Rats

Ma, Jin; Ren, Xinling; Purdy, Ralph E.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-43 - P-44; In English; See also 20070022623; Copyright; Avail.: Other Sources

The aim of this work was to investigate the effects of simulated microgravity on dilatory responsiveness and Nitric Oxide Synthase (NOS) expression of abdominal aorta in rats. Twenty male healthy SD rats were divided into control group and simulated microgravity group randomly. After 4 weeks, using isolated arterial rings from rats, arterial dilatory responsiveness of abdominal aorta were examined in vitro. And the expression of nitric oxide synthase were observed by Western Blot. The

data showed: Dilatory responses of arterial rings to L-Arginin (10(exp -8) - 10(exp -3) mol/L), and Acetylcholine(10(exp -10) - (exp -4) mol/L) were decreased in simulated microgravity rats as compared with that of controls; but dilatory responses of isolated aortic rings to Sodium Nitroprusid (10(exp -10) - (exp -4) mol/L) and 8-bromo-cGMP(10(exp -8) - 10(exp -3) mol/L) were similar in both simulated Microgravity rats and control rats. The expression of both eNOS and iNOS had not showed significant differences between two groups. The data indicate that endothelium dependent vasorelaxation in abdominal aortic rings are decreased by 4-week simulated microgravity. and this change may be result from altered NOS activity in endothelium.
Author
Aorta; Endothelium; Microgravity; Nitric Oxide; Physiological Effects; Gravitational Physiology

20070022714 Fourth Military Medical Univ., Xi'an, China
Effects of Self-Generated Lower Body Negative Pressure Training on Cardiovascular Function and Lower Body Negative Pressure Tolerance
Yang, Changbin; Sun, Ziqing; Wang, Yongchun; Yao, Yongjie; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-49 - P-50; In English; See also 20070022623; Copyright; Avail.: Other Sources

To explore the changes of cardiac function and lower body negative pressure tolerance after self-generated Lower Body Negative Pressure device training, and to provide experimental evidences for its application is presented. 12 healthy male subjects were randomly divided into two groups, and received training with a specially designed self-generated lower body negative pressure device with the valve entirely closed or open to -30mmHg of peak LBNP respectively. Group A were trained three minutes per day for five days. Heart pumping function, tolerance to LBNP and HUT were determined pre-training, training for 3d and post-training. Group B were trained for ten days and five minutes each day. The examinations were as same as those done in group A. Heart function decreased and tolerance to LBNP increased significantly(p less than 0.05) in group A subjects. In group B, both heart function and tolerance to LBNP increased significantly after training for 8 days. It suggested that lower body negative pressure tolerance could be improved by training with self-generated Lower Body Negative Pressure device. The changes of cardiovascular function, however, depend on the protocol of training. Protocol that valve was closed entirely was suitable for anti-G straining maneuver training, while another protocol which valve opened partly may be much more suitable for countermeasuring the cardiovascular dysfunction during medium or long time space flight.
Author (revised)
Cardiovascular System; Education; Heart Function; Lower Body Negative Pressure; Orthostatic Tolerance

20070022715 Osaka Kyoiku Univ., Japan
Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice
Morikuni, Sayaka; Ohira, Takashi; Wang, Xiao Dong; Terada, Masahiro; Kawano, Fuminori; Matsuoka, Yoshikazu; Lan, Yong Bo; Yamamoto, Hiroshi; Ito, Tsunekata; Goto, Katsumasa; Seki, Takaharu; Ohira, Yoshinobu, et al.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-81 - P-82; In English; See also 20070022623
Contract(s)/Grant(s): JSPS-15200049; MOE-15700417; MOH-16B-2; Copyright; Avail.: Other Sources

Role of macrophage in the regulation of fast-twitch plantaris muscle in response to gravitational unloading was investigated in adult op/op (-/-) mice with deficient macrophage colony stimulating factor (M-CSF). The wild type (+/+) mice were also utilized as controls. They were separated into cage control and unloaded groups. The mice in the unloaded group were hindlimb-suspended for 10 days. The sampling of plantaris muscle was performed immediately after the termination of suspension. The expression of myosin heavy chain, specific activities of succinate dehydrogenase and a-glycerophosphate dehydrogenase, and fiber cross-sectional area (CSA) were analyzed in the serial cross-sections of midbelly region of muscle. The fiber CSA decreased by unloading only in -1- mice, although changes of neither the fiber phenotype nor enzyme activities were noted. Data suggest that even fast-twitch muscle is susceptible to unloading, if M-CSF is deficient.
Author
Macrophages; Mice; Muscle Fibers; Muscles; Microgravity; Gravitational Physiology; Gravitational Effects; Physiological Effects; Physiological Responses

20070022716 Osaka City Univ., Japan
The Mechanism and Significance of Gravity Resistance in Plants
Hoson, Takayuki; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-97 - P-100; In English; See also 20070022623; Copyright; Avail.: Other Sources

After plants first went ashore about 450 million years ago, they have developed a response to resist the strong gravitational

force. Plants have constructed a tough body by increasing cell wall rigidity, which is brought about by modification of the cell wall metabolism and of cell wall environment. The increase in the level of cortical microtubules as well as their reorientation is also involved in gravity resistance. The development of such mechanisms of gravity resistance has played an important role in the transition of plant ancestors from an aquatic environment to a terrestrial environment and the consequent establishment of land plants, the most dramatic epoch in plant evolution.
Author
Plants (Botany); High Gravity Environments; Resistance; Cytology

53
BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

20070022270 NASA Johnson Space Center, Houston, TX, USA
A Review of Training Methods and Instructional Techniques: Implications for Behavioral Skills Training in U.S. Astronauts
Hysong, Sylvia J.; Galarza, Laura; Holland, Albert W.; May 2007; 40 pp.; In English
Report No.(s): NASA/TP-2007-213726; S-986; Copyright; Avail.: CASI: A03, Hardcopy

Long-duration space missions place on crewmembers unique physical, environmental, and psychological demands that directly affect their ability to live and work in space. A growing body of research on crews working for extended periods in isolated, confined environments reveals the existence of psychological and performance problems in varying degrees of magnitude. Research has also demonstrated that although the environment plays a cathartic role, many of the problems encountered are due to interpersonal frictions that affect individuals differently. Consequently, crewmembers often turn to maladaptive be?haviors as coping mechanisms, resulting in decreased productivity and psychological discomfort. From this research, critical skills have been identified that can help a crewmember better navigate the psychological challenges of long-duration spaceflight. Although most people lack several of these skills, the majority can be learned, so a training program can be designed to teach crewmembers effective leadership, teamwork, and self-care strategies that will help minimize the emergence of maladaptive behaviors. The purpose of this report is to review the training literature to help determine the optimal instructional methods to use in delivering psychological skill training to the U.S. Astronaut Expedition Corps; and to detail the structure and content of the proposed Astronaut Expedition Corps Psychological Training Program.
Author
Long Duration Space Flight; Psychological Factors; Astronaut Training; Astronaut Performance; Space Psychology; Space Flight Stress; Emotional Factors; Training Analysis

20070022327 NASA Johnson Space Center, Houston, TX, USA, Wyle Labs., Inc., Houston, TX, USA
Comparison of Two Alternate Methods for Tracking Toe Clearance
Miller, Christopher A.; Feiveson, Alan H.; Bloomberg, Jacob J.; [2007]; 15 pp.; In English; Original contains black and white illustrations
Contract(s)/Grant(s): NCC9-58; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022327

Analyses of toe clearance during the swing phase of locomotion has often been utilized in determining a subject s propensity to trip while either walking or stepping over an obstacle. In the literature, toe clearance has been studied using a marker on the superior aspect of the second toe (rtoe), a marker on the lateral aspect of the fifth metatarsal head (mth5), or a virtual marker positioned at the anterior tip of the toe (vtoe). The purpose of this study was to compute toe clearance and associated parameters using a fifth metatarsal marker and a virtual toe marker, and compare the results with those of the standard toe marker. Subjects walked on a motorized treadmill at five different speeds while performing a visual acuity task at two separate target distances (ten 60-second trials). The minimum vertical height (TCl) was determined for each stride, along with its point of occurence in the gait cycle, and the angles of the foot and ankle at that time. A regression analysis was performed on the vtoe and mth5 results versus rtoe individually. For all TCl parameters, the mth5 marker did not correlate well with rtoe; the vtoe marker showed better agreement. Most importantly, the mth5 marker predicted a later occurence of TCl than rtoe and vtoe - thereby missing the most dangerous point in swing phase for a trip. From this analysis, the vtoe marker proved to be a better analog to rtoe than mth5, especially for determining a subject s propensity to trip.
Author
Locomotion; Walking; Visual Acuity; Regression Analysis; Gait; Clearances

20070022656 Osaka Univ., Osaka, Japan

Microarray Analysis of Hippocampal Gene Expression in Rats Exposed to Hypergravity

Mitani, Kenji; Horii, Arata; Masumura, Chisako; Kitahara, Tadashi; Kubo, Takeshi; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-31 - P-32; In English; See also 20070022623; Copyright; Avail.: Other Sources

We have reported that animals exposed to hypergravity showed impaired spatial learning in a radial ann maze, suggesting that the constant gravity is essential for correct spatial orientation. In order to elucidate a role of hippocampus, which is thought to be an important brain area for the spatial cognition, we investigated hippocampal gene expression in rats exposed to hypergravity using a microarray analysis. Rats were exposed to hypergravity (2G) for 2 weeks in a centrifuge device. Their performance in a radial maze was then examined to confirm that spatial learning was actually impaired. Then, the rats were sacrificed and CA1 area of bilateral hippocampi was dissected and forwarded to the microarray analysis. We could identify 37 known genes up-regulated more than 1.3 times after hypergravity exposure. Among them, a real-time PCR confirmed an up-regulation of insulin-like growth factor binding protein 2 (Igfbp2) gene expression. We supposed that Igfbp2 gene in the hippocampus would be one of candidate genes responsible for a recovery of spatial orientation following hypergravity load. Author

Gene Expression; High Gravity Environments; Hippocampus; Rats; Gravitational Effects; Gravitation

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*.

20070022296 Chinese Research Academy of Environmental Science, China

Research Advancement of Superhydrophilic Thin Film in Condensation Heat Regenerators

HOU, Wenhua; LIU, Jing-xia; CHEN, Xiao; ZHAO, Kang-han; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 75-78; In Chinese; See also 20070022282; Copyright; Avail.: Other Sources

Superhydrophilic thin film is the key part of condensation heat regenerators for the high performance of water/air separation in space station. Progress in research and manufacture of various superhydrophilic films were introduced. Also the performance and manufacture technique of thin films were compared and analyzed. It is concluded that gamma-Al2O3 thin film was considered to be preferable for the condensation heat regenerators used in space station.

Author

Thin Films; Film Condensation; Aluminum Oxides; Regenerators; Space Stations; Airspace

20070022298 Institute of Space Medico-Engineering, Beijing, China

Design and Implement of the ECLSS Adaptive Learning Intelligent Decision Support System

DENG, Yi-bing; BA, Jie; HU, Wei; SHEN, Jun-yi; Space Medicine and Medical Engineering, Vol. 20 No. 1; February 2007, pp. 57-61; In English; See also 20070022282; Copyright; Avail.: Other Sources

Objective: To monitor state of environment control and life support system (ECLSS) , and to diagnose faults and provide decision support in manned space flight. Methods: According to the principle of decision support system, neural networks and the expert system, the foundational constructional structure and work flow of the ECLSS decision support system(EDSS) were designed, fault tree analyze(FTA) method was used to sort all of the faults and to form the expert knowledge framework, expert system and neural networks were integrated to adaptive learning from experience. Results: In the two-men-five-days SZ-6 manned space flight, this software system worked well, and had reduced the difficulty and intensity of ground flight control and had provided good technological support for the consummation of this flight. Conclusion: For the first time, the ECLSS decision support system is designed and implemented by using database and expert system technology. It can judge parameters state and diagnose faults exactly and rapidly, and the data models are designed correctly to give the rational result of parameter prediction.

Author

Decision Support Systems; Environmental Control; Life Support Systems; Neural Nets; Expert Systems; Manned Space Flight; Fault Trees

20070022342 NASA Johnson Space Center, Houston, TX, USA

Overview of Potable Water Systems on Spacecraft Vehicles and Applications for the Crew Exploration Vehicle (CEV)

Peterson, Laurie J.; Callahan, Michael R.; July 09, 2007; 11 pp.; In English; 37th International Conference on Environmental Systems, 7-9 July 2007, Chicago, IL, USA; Copyright; Avail.: Other Sources; Abstract Only

Providing water necessary to maintain life support has been accomplished in spacecraft vehicles for over forty years. This paper will investigate how previous U.S. space vehicles provided potable water. The water source for the spacecraft, biocide used to preserve the water on-orbit, water stowage methodology, materials, pumping mechanisms, on-orbit water requirements, and water temperature requirements will be discussed. Where available, the hardware used to provide the water and the general function of that hardware will also be detailed. The Crew Exploration Vehicle (CEV or Orion) water systems will be generically discussed to provide a glimpse of how similar they are to water systems in previous vehicles. Conclusions on strategies that could be used for CEV based on previous spacecraft water systems will be made in the form of questions and recommendations.

Author

Technology Utilization; Potable Water; Life Support Systems; Crew Exploration Vehicle; Water Vehicles

20070022495 NASA Johnson Space Center, Houston, TX, USA

International Space Station Environmental Control and Life Support System Status: 2006 - 2007

Williams, David E.; Gentry, Gregory J.; July 09, 2007; 16 pp.; In English; 37th International Conference on Environmental Systems, 9-12 July 2007, Warrendale, PA, USA; Original contains color illustrations

Contract(s)/Grant(s): 401769.06.01.01.01

Report No.(s): ICES 2007-01-3098; Copyright; Avail.: Other Sources

The International Space Station (ISS) Environmental Control and Life Support (ECLS) system includes regenerative and non-regenerative technologies that provide the basic life support functions to support the crew, while maintaining a safe and habitable shirtsleeve environment. This paper provides a summary of the U.S. ECLS system activities over the past year, covering the period of time between March 2006 and February 2007. The ISS continued permanent crew operations, with the start of Phase 3 of the ISS Assembly Sequence. Work continued on the Phase 3 pressurized elements and the continued manufacturing and testing of the regenerative ECLS equipment.

Author

Environmental Control; International Space Station; Life Support Systems; Manned Space Flight; Technology Utilization

55
EXOBIOLOGY

Includes astrobiology; planetary biology; and extraterrestrial life. For the biological effects of aerospace environments on humans see *52 Aerospace Medicine*; on animals and plants see *51 Life Sciences*. For psychological and behavioral effects of aerospace environments see *53 Behavioral Sciences*.

20070022650 GosNIIGenetika, Moscow, Russia

Comparative Analysis of Life Activity of Microoganisms Exposed to Short-Term Spaceflights

Voeikova, Tatiana A.; Tabakov, Viacheslav Yu.; Voeikova, Tatiana A.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-209 - P-212; In English; See also 20070022623; Copyright; Avail.: Other Sources

In 1996-2005, streptomycetes, bacilli and enterobacteria were flown on Mir and Foton-M2 to study spaceflight effects on microorganisms. Streptomycetes developed changes in their morphogenesis and antibiotic activity, while bacilli remained essentially unchanged, and enterobacteria showed a higher survival rate than on Earth. The conjugative transfer of plasmids from enterobacteria to streptomycetes was accelerated. The 6-14 day exposure to the space environment did not increase mutation frequencies in streptomycetes or bacilli and did not cause plasmid DNA loss. However, streptomycetes carried on the outer wall of the Mir station showed significant genetic changes.

Author

Space Flight; Aerospace Environments; Microorganisms; Deoxyribonucleic Acid; Genetics; Spacecraft Environments

20070022712 Russian Academy of Medical Sciences, Russian Federation

Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2

Balaban, P. M.; Malyshev, A. Y.; Zakharov, I. S.; Aseev, N. A.; Bravarenko, N. I.; Ierusalimsky, V. N.; Samarova, A. I.; Vorontzov, D. D.; Popova, Y.; Boyle, R.; Journal of Gravitational Physiology, Volume 13, No. 1; July 2006, pp. P-201 - 204; In English; See also 20070022623; Original contains black and white illustrations; Copyright; Avail.: Other Sources

In terrestrial gastropod snail Helix lucorum L. we studied the changes after a 16-day exposure to microgravity in:

behavior, neural responses to adequate motion stimulation, intersensory interactions between the photosensory pathways and the statocyst receptors, and in expression of the HPeP gene in the statocyst receptors. In behavioral experiments it was found that the latency of body position change to sudden orientation change (flip from horizontal to downwards position) was significantly reduced in the postflight snails. Extracellularly recorded neural responses of the statocyst nerve to adequate motion stimulation in the postflight snails were independent of the motion direction while in the control animals an orientation selectivity was observed. Significant differences in the HPeP gene mRNA expression pattern in the statocyst receptor neurons were observed in postflight (30h) and control snails. Obtained results confirm the possibility to elucidate the influence of microgravity exposure on mechanisms and function of gravireceptors using this simple model animal.
Author
Animals; Gene Expression; Snails; Aerospace Environments; Bioastronautics; Space Flight

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.

20070022414 NASA Glenn Research Center, Cleveland, OH, USA
A Software Platform for Post-Processing Waveform-Based NDE
Roth, Donald J.; Martin, Richard E.; Seebo, Jeff P.; Trinh, Long B.; Walker, James L.; Winfree, William P.; June 03, 2007; 15 pp.; In English; SAMPE 07, 3-7 Jun. 2007, Baltimore, MD, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 510505.03.03.01.08; WBS 843515.02.01.03.03.01.08; Copyright; Avail.: CASI: A03, Hardcopy

Ultrasonic, microwave, and terahertz nondestructive evaluation imaging systems generally require the acquisition of waveforms at each scan point to form an image. For such systems, signal and image processing methods are commonly needed to extract information from the waves and improve resolution of, and highlight, defects in the image. Since some similarity exists for all waveform-based NDE methods, it would seem a common software platform containing multiple signal and image processing techniques to process the waveforms and images makes sense where multiple techniques, scientists, engineers, and organizations are involved. This presentation describes NASA Glenn Research Center's approach in developing a common software platform for processing waveform-based NDE signals and images. This platform is currently in use at NASA Glenn and at Lockheed Martin Michoud Assembly Facility for processing of pulsed terahertz and ultrasonic data. Highlights of the software operation will be given. A case study will be shown for use with terahertz data. The authors also request scientists and engineers who are interested in sharing customized signal and image processing algorithms to contribute to this effort by letting the authors code up and include these algorithms in future releases.
Author
Nondestructive Tests; Waveforms; Software Engineering; Computer Programs; Ultrasonics; Imaging Techniques

20070022429 Massachusetts Inst. of Tech., Cambridge, MA, USA
CAPRI: A Geometric Foundation for Computational Analysis and Design
Haimes, Robert; October 2006; 10 pp.; In English
Contract(s)/Grant(s): NAG1-02040; No Copyright; Avail.: CASI: A02, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022429

CAPRI is a software building tool-kit that refers to two ideas; (1) A simplified, object-oriented, hierarchical view of a solid part integrating both geometry and topology definitions, and (2) programming access to this part or assembly and any attached data. A complete definition of the geometry and application programming interface can be found in the document CAPRI: Computational Analysis PRogramming Interface appended to this report. In summary the interface is subdivided into the following functional components: 1. Utility routines -- These routines include the initialization of CAPRI, loading CAD parts and querying the operational status as well as closing the system down. 2. Geometry data-base queries -- This group of functions allow all top level applications to figure out and get detailed information on any geometric component in the Volume definition. 3. Point queries -- These calls allow grid generators, or solvers doing node adaptation, to snap points directly onto geometric entities. 4. Calculated or geometrically derived queries -- These entry points calculate data from the geometry to aid in grid generation. 5. Boundary data routines -- This part of CAPRI allows general data to be attached to Boundaries so that the boundary conditions can be specified and stored within CAPRI s data-base. 6. Tag based routines -- This part of the API allows the specification of properties associated with either the Volume (material properties) or Boundary (surface properties) entities. 7. Geometry based interpolation routines -- This part of the API facilitates Multi-disciplinary coupling and

allows zooming through Boundary Attachments. 8. Geometric creation and manipulation -- These calls facilitate constructing simple solid entities and perform the Boolean solid operations. Geometry constructed in this manner has the advantage that if the data is kept consistent with the CAD package, therefore a new design can be incorporated directly and is manufacturable. 9. Master Model access This addition to the API allows for the querying of the parameters and dimensions of the model. The feature tree is also exposed so it is easy to see where the parameters are applied. Calls exist to allow for the modification of the parameters and the suppression/unsuppression of nodes in the tree. Part regeneration is performed by a single API call and a new part becomes available within CAPRI (if the regeneration was successful). This is described in a separate document. Components 1-7 are considered the CAPRI base level reader.
Derived from text
Computer Programs; Analysis (Mathematics); Application Programming Interface; Object-Oriented Programming; Computational Geometry

64
NUMERICAL ANALYSIS

Includes iteration, differential and difference equations, and numerical approximation.

20070022276 NASA Johnson Space Center, Houston, TX, USA
An Improved Transformation and Optimized Sampling Scheme for the Numerical Evaluation of Singular and Near-Singular Potentials
Khayat, Michael A.; Wilton, Donald R.; Fink, Patrick W.; [2007]; 4 pp.; In English; IEEE AP-S International Symposium 2007, 10-15 Jun. 2007, Honolulu, HI, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Simple and efficient numerical procedures using singularity cancellation methods are presented for evaluating singular and near-singular potential integrals. Four different transformations are compared and the advantages of the Radial-angular transform are demonstrated. A method is then described for optimizing this integration scheme.
Author
Numerical Integration; Singularity (Mathematics); Transformations (Mathematics); Optimization

65
STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; time series analysis; and stochastic processes.

20070022338 Pioneer Aerospace Corp., South Windsor, CT, USA
Design, Development and Flight Testing of the U.S. Army 4200 sq ft Parafoil Recovery System
Bennett, Thomas W.; Fox, Roy, Jr.; May 23, 2005; 3 pp.; In English; 18th AIAA Aerodynamic Decelerator System Technology Conference and Seminar, 23-25 May, 2005, Munich, Germany; Original contains black and white illustrations
Contract(s)/Grant(s): NAS9-00076
Report No.(s): AIAA Paper 2005-1628; Copyright; Avail.: CASI: A01, Hardcopy

The purpose of this paper is to describe the design, development and flight-testing of the U.S. Army 4200 sq ft parafoil recovery system built under NASA Contract NAS 9-00076. The 4200 f? parafoil described herein was a potential candidate to fulfill the U.S. Army requirement for a 10,000 lb useable payload precision guided recovery system. Design heritage as well as specific features, like lower surface inlets, confluence fitting, upper surface energy modulator design, deployment bag design and 60 ft diameter Ringslot drogue will be discussed. Initial flight test results, ground testing of various components to verify design margin and configuration changes will also be discussed. The 4200 sq ft parafoil recovery system completed three flight tests during 2003 at payload weights of over 15,000 Ibs
Author
Parafoils; Payloads; Ground Tests; Flight Tests; Deployment; Convergence

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*.

20070022222 NASA Glenn Research Center, Cleveland, OH, USA
Cool and Quiet: Partnering to Enhance the Aerodynamic and Acoustic Performance of Installed Electronics Cooling Fans: A White Paper
Koch, L. Danielle; VanZante, Dale E.; August 2006; 11 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): WBS 561581.02.08.03.03.01
Report No.(s): NASA/TM-2006-214449; E-15712; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022222

Breathtaking images of distant planets. Spacewalks to repair a telescope in orbit. Footprints on the moon. The awesome is made possible by the mundane. Every achievement in space exploration has relied on solid, methodical advances in engineering. Space exploration fuels economic development like no other endeavor can. But which advances will make their way into our homes and businesses? And how long will it take? Answers to these questions are dependent upon industrial involvement in government sponsored research initiatives, market demands, and timing. Recognizing an opportunity is half the battle. This proposal describes the framework for a collaborative research program aimed at improving the aerodynamic and acoustic performance of electronics cooling fans. At its best, the program would involve NASA and academic researchers, as well as corporate researchers representing the Information Technology (IT) and fan manufacturing industries. The momentum of space exploration, the expertise resultant from the nation's substantial investment in turbofan noise reduction research, and the competitiveness of the IT industry are intended to be catalysts of innovation.
Author
Acoustic Properties; Cooling Systems; Noise Reduction; Aerodynamic Noise; Turbofans; Technology Utilization; Turbofan Engines

20070022262 Massachusetts Inst. of Tech., Cambridge, MA, USA, NASA Langley Research Center, Hampton, VA, USA
Aero-acoustics of Drag Generating Swirling Exhaust Flows
Shah, P. N.; Mobed, D.; Spakovszky, Z. S.; Brooks, T. F.; Humphreys, W. M. Jr.; May 21, 2007; 11 pp.; In English; 13th AIAA/CEAS Aeroacoustics Conference, 21-23 May 2007, Rome, Italy; Original contains color illustrations
Report No.(s): AIAA Paper 2007-3714; Copyright; Avail.: CASI: A03, Hardcopy

Aircraft on approach in high-drag and high-lift configuration create unsteady flow structures which inherently generate noise. For devices such as flaps, spoilers and the undercarriage there is a strong correlation between overall noise and drag such that, in the quest for quieter aircraft, one challenge is to generate drag at low noise levels. This paper presents a rigorous aero-acoustic assessment of a novel drag concept. The idea is that a swirling exhaust flow can yield a steady, and thus relatively quiet, streamwise vortex which is supported by a radial pressure gradient responsible for pressure drag. Flows with swirl are naturally limited by instabilities such as vortex breakdown. The paper presents a first aero-acoustic assessment of ram pressure driven swirling exhaust flows and their associated instabilities. The technical approach combines an in-depth aerodynamic analysis, plausibility arguments to qualitatively describe the nature of acoustic sources, and detailed, quantitative acoustic measurements using a medium aperture directional microphone array in combination with a previously established Deconvolution Approach for Mapping of Acoustic Sources (DAMAS). A model scale engine nacelle with stationary swirl vanes was designed and tested in the NASA Langley Quiet Flow Facility at a full-scale approach Mach number of 0.17. The analysis shows that the acoustic signature is comprised of quadrupole-type turbulent mixing noise of the swirling core flow and scattering noise from vane boundary layers and turbulent eddies of the burst vortex structure near sharp edges. The exposed edges are the nacelle and pylon trailing edge and the centerbody supporting the vanes. For the highest stable swirl angle setting a nacelle area based drag coefficient of 0.8 was achieved with a full-scale Overall Sound Pressure Level (OASPL) of about 40dBA at the ICAO approach certification point.
Author
Acoustic Measurement; Acoustic Properties; Aeroacoustics; Aerodynamic Characteristics; Aerodynamic Drag; Aerodynamic Noise; Flow Noise; Swirling; Exhaust Gases; Aircraft Noise; Noise Reduction

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*.

20070022337 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Summary of LET Requirements/Testing
Ladbury, Ray; January 23, 2007; 19 pp.; In English; 8th ESA/ESTEC D/TEC-QCA 2007, 23-24 January 2007, Louvain-la Neuve, Belgium; Original contains color and black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022337

The performance of the Michigan State SEETF during its inaugural runs is evaluated. Beam profiles and other diagnostics are presented, and prospects for future development and testing are evaluated.
Author
Linear Energy Transfer (LET); Test Facilities; Requirements; Single Event Upsets

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*.

20070022514 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Performance Characterization and Vibration Testing of 30-cm Carbon-Carbon Ion Optics
Steven Snyder, John; Brophy, John R.; July 11, 2004; 12 pp.; In English; 40th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, 11-14 Jul. 2004, Fort Lauderdale, FL, USA; Original contains black and white illustrations
Report No.(s): AIAA Paper 2004-3959; Copyright; Avail.: Other Sources
ONLINE: http://hdl.handle.net/2014/39981

Carbon-based ion optics have the potential to significantly increase the operable life and power ranges of ion thrusters because of reduced erosion rates compared to molybdenum optics. The development of 15-cm and larger diameter grids has encountered many problems, however, not the least of which is the ability to pass vibration testing. JPL has recently developed a new generation of 30-cm carbon-carbon ion optics in order to address these problems and demonstrate the viability of the technology. Perveance, electron backstreaming, and screen grid transparency data are presented for two sets of optics. Vibration testing was successfully performed on two different sets of ion optics with no damage and the results of those tests are compared to models of grid vibrational behavior. It will be shown that the vibration model is a conservative predictor of grid response and can accurately describe test results. There was no change in grid alignment as a result of vibration testing and a slight improvement, if any change at all, in optics performance.
Author
Ion Optics; Vibration Tests; Ion Engines; Performance Prediction; Computational Grids; Carbon

89
ASTRONOMY

Includes observations of celestial bodies; astronomical instruments and techniques; radio, gamma-ray, x-ray, ultraviolet, and infrared astronomy; and astrometry.

20070022510 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Gamma-ray Spectral Characteristics of Thermal and Non-thermal Emission from Three Black Holes
Ling, James C.; Wheaton, William A.; June 7, 2004; 6 pp.; In English; 5th Internatioanl Microquasar Workshop, 5-13 Jun. 2004, Beijing, China; Original contains black and white illustrations; Copyright; Avail.: Other Sources
ONLINE: http://hdl.handle.net/2014/39951

Cygnus X-1 and the gamma-ray transients GROJ0422+32 and GROJ1719-24 displayed similar spectral properties when they underwent transitions between the high and low gamma-ray (30 keV to few MeV) intensity states. When these sources were in the high (gamma)-ray intensity state ((gamma)2, for Cygnus X-l), their spectra featured two components: a Comptonized shape below 200-300 keV with a soft power-law tail (photon index >= 3) that extended to ~1 MeV or beyond.

When the sources were in the low-intensity state ((gamma)0, for Cygnus X-l), the Comptonized spectral shape below 200 keV typically vanished and the entire spectrum from 30 keV to ~1 MeV can be characterized by a single power law with a relatively harder photon index ~2-2.7. Consequently the high- and low-intensity gamma-ray spectra intersect, generally in the ~400 KeV - ~1 MeV range, in contrast to the spectral pivoting seen previously at lower (~10 keV) energies. The presence of the power-law component in both the high- and low-intensity gammaray spectra strongly suggests that the non-thermal process is likely to be at work in both the high and the low-intensity situations. We have suggested a possible scenario (Ling & Wheaton, 2003), by combining the ADAF model of Esin et al. (1998) with a separate jet region that produces the non-thermal gamma-ray emission, and which explains the state transitions. Such a scenario will be discussed in the context of the observational evidence, summarized above, from the database produced by EBOP, JPL's BATSE earth occultation analysis system.
Author
Black Holes (Astronomy); Gamma Ray Spectra; Thermal Emission; Cygnus Constellation

90
ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

20070022335 NASA Goddard Space Flight Center, Greenbelt, MD, USA
General Astrophysics with TPF: Not Just Dark Energy
Kuchner, Marc; November 11, 2006; 1 pp.; In English; 4th International TPF/Darwin Workshop: Star-Planet Interactions and Implications for Habitability, 8-11 November 2006, Pasadena, CA, USA; No Copyright; Avail.: Other Sources; Abstract Only

Besides searching for Earth-LIke Planets, TPF can study Jupiters, Neptunes, and all sorts of exotic planets. It can image debris-disks, YSO disks, AGN disks, maybe even AGB disks. And you are probably aware that a large optical space telescope like TPF-C or TPF-O can be a fantastic tool for studying the equation of state of the Dark Energy. I will review some of the future science of TPF-C, TPF-I and TPF-O, focusing on the applications of TPF to the study of objects in our Galaxy: especially circumstellar disks and planets other than exo-Earths.
Author
Astrophysics; Dark Energy; Jupiter (Planet); Neptune (Planet); Terrestrial Planets

20070022455 Birmingham Univ., UK
The Evolution of the Cluster X-ray Scaling Relations in the Wide Angle ROSAT Pointed Survey Sample at 0.6 < z < 1.0
Maughan, B. J.; Jones, L. R.; Ebeling, H.; Scharf, C.; Monthly Notices of the Royal Astronomical Society; January 2006; Volume 365, Issue 2, pp. 509-529; In English; Original contains black and white illustrations
Contract(s)/Grant(s): PF4-50034; NAS8-03060; NNG06GB68G; NAG5-10085; Copyright; Avail.: Other Sources
ONLINE: http://dx.doi.org/10.1111/j.1365-2966.2005.09717.x

The X-ray properties of a sample of 11 high-redshift (0.6 < z < 1 .O) clusters observed with Chardm and/or XMM-Newton are used to investigate the evolution of the cluster scaling relations. The observed evolution in the normalization of the L-T, M-T, M(sub 2)-T and M-L relations is consistent with simple self-similar predictions, in which the properties of clusters reflect the properties of the Universe at their redshift of observation. Under the assumption that the model of self-similar evolution is correct and that the local systems formed via a single spherical collapse, the high-redshift L-T relation is consistent with the high-z clusters having virialized at a significantly higher redshift than the local systems. The data are also consistent with the more realistic scenario of clusters forming via the continuous accretion of material. The slope of the L-T relation at high redshift (B = 3.32 +/- 0.37) is consistent with the local relation, and significantly steeper than the self-similar prediction of B = 2. This suggests that the same non-gravitational processes are responsible for steepening the local and high-z relations, possibly occurring universally at z is approximately greater than 1 or in the early stages of the cluster formation, prior to their observation. The properties of the intracluster medium at high redshift are found to be similar to those in the local Universe. The mean surface-brightness profile slope for the sample is Beta = 0.66 +/- 0.05, the mean gas mass fractions within R(sub 2500(z)) and R(200(z)) are 0.069 +/- 0.012 and 0.11 +/- 0.02, respectively, and the mean metallicity of the sample is 0.28 +/- 0.11 Z(sub solar).
Author
Galactic Clusters; Intergalactic Media; Red Shift; Universe; Cosmology; X Ray Astronomy

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*.

20070022280 NASA Kennedy Space Center, Cocoa Beach, FL, USA
Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program
Sibille, Laurent; Carpenter, Paul; Rickman, Doug; Owens, Charles; French, Raymond; McLemore, Carole; June 04, 2006; 2 pp.; In English; Planetary and Terrestrial Mining Sciences Symposium, 4-7 June 2006, Sudbury, Ont., Canada; Copyright; Avail.: CASI: A01, Hardcopy

The development of surface technologies for NASA's human and robotic lunar program beyond 2010 has begun. The multitude of projects underway and future ones will soon rely on the availability of lunar regolith simulant materials chosen to simulate the characteristics of lunar regoliths in order to design, test and qualify prototype hardware and flight equipment. The selection and development of standard lunar regolith simulants (SLRS) for the use of NASA technology programs was one of the main recommendations of the 2005 Workshop on Lunar Regolith Simulant Materials at Marshall Space Flight Center. The realization of that objective is now underway through the NASA simulant development program at the Marshall Space Flight Center. The approach adopted to define materials requirements for standard simulants of regolith from the Highlands regions of the Moon will be presented along with a discussion of limitations inherent to such an endeavor.
Author
Lunar Rocks; Regolith; Simulation; Analogies; Lunar Composition; Lunar Maria; Lunar Soil; Lunar Resources

20070022281 NASA Marshall Space Flight Center, Huntsville, AL, USA
Development Issues for Lunar Regolith Simulants
Rickman, Doug; Carpenter, Paul; Sibille, Laurent; Owens, Charles; French, Raymond; McLemore, Carole; June 04, 2006; 2 pp.; In English; Planetary and Terrestrial Mining Sciences Symposium, Sudbury, Ont., Canada, June 4-7, 2006, 4-7 June 2006, Sudbury, Ont., Canada; Copyright; Avail.: CASI: A01, Hardcopy

Significant challenges and logistical issues exist for the development of standardized lunar regolith simulant (SLRS) materials for use in the development and testing of flight hardware for upcoming NASA lunar missions. A production program at Marshall Space Flight Center (MSFC) for the deployment of lunar mare basalt simulant JSC-lA is underway. Root simulants have been proposed for the development of a low-T mare basalt simulant and a high-Ca highland anorthosite simulant, as part of a framework of simulant development outlined in the 2005 Lunar Regolith Simulant Materials Workshop held at MSFC. Many of the recommendation for production and standardization of simulants have already been documented by the MSFC team. But there are a number of unanswered questions related to geology which need ta be addressed prior to the creation of the simulants.
Author
Lunar Maria; Lunar Rocks; Simulation; Analogies; Lunar Composition; Lunar Soil; Selenology

20070022411 NASA Glenn Research Center, Cleveland, OH, USA
Propellant Gauging for Exploration
Zimmerli, Gregory A.; May 14, 2007; 8 pp.; In English; 54th JANNAF Propulsion Meeting, 14-19 May 2007, Denver, CO, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 253225.04.01.02.05.03.03; No Copyright; Avail.: CASI: A02, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022411

This paper presents a brief overview of propellant gauging needs and requirements in the context of lunar exploration missions defined by the Exploration Systems Architecture Study (ESAS) report. A timeline for the development and testing of gauging technologies, and a few key design review dates are presented. A lunar exploration mission scenario is discussed which aids in defining the propellant gauging needs. The fleet of new exploration vehicles includes the Ares I and Ares V launch vehicles, Earth Departure Stage (EDS), Lunar Surface Access Module (LSAM) ascent and descent stages, and the Orion Crew Exploration Vehicle (CEV). The liquid propellant choices are currently oxygen - hydrogen for the launch vehicles, the EDS, and LSAM descent module; oxygen - methane for LSAM ascent module; and monomethylhydrazine nitrogen tetroxide (MMH-NTO) for the CEV. Estimated tank sizes, temperatures, pressures, and storage durations are presented.

A baseline propellant gauging system is proposed that is based on high Technology Readiness Level (TRL) gauging technologies. In order to be considered for use on the new exploration vehicles, any new gauging technologies will have to show a clear benefit over the baseline methods in terms of performance and/or cost.
Author
Liquid Rocket Propellants; Lunar Exploration; Propellant Tanks; Systems Engineering; Measuring Instruments

20070022434 NASA Johnson Space Center, Houston, TX, USA
In-situ Resource Utilization (ISRU) and Lunar Surface Systems
Sanders, Jerry; Larson, Bill; Sacksteder, Kurt; June 14, 2007; 18 pp.; In English; Workshop on Research Enabled by the Lunar Environment, 14-15 June 2007, Washington, DC, USA; Original contains color illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022434

This viewgraph presentation reviews the benefits of In-Situ Resource Utilization (ISRU) on the surface of the moon. Included in this review is the commercialization of Lunar ISRU. ISRU will strongly influence architecture and critical technologies. ISRU is a critical capability and key implementation of the Vision for Space Exploration (VSE). ISRU will strongly effects lunar outpost logistics, design and crew safety. ISRU will strongly effect outpost critical technologies. ISRU mass investment is minimal compared to immediate and long-term architecture delivery mass and reuse capabilities provided. Therefore, investment in ISRU constitutes a commitment to the mid and long term future of human exploration.
CASI
Lunar Surface; Spacecrews; In Situ Resource Utilization; Lunar Resources; Selenology; Lunar Mining; Lunar Based Equipment

20070022437 Science Applications International Corp., USA
NASA/ESMD Analogue Mission Plans
Hoffman, Stephen J.; June 18, 2007; 17 pp.; In English; 2nd International WOrkshop: Exploring Mars and Its Earth Analogues, 1923 June 2007, Trento, Italy; Original contains color illustrations
Contract(s)/Grant(s): T-502X; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: http://hdl.handle.net/2060/20070022437

A viewgraph presentation exploring Earth and its analogues is shown. The topics include: 1) ESMD Goals for the Use of Earth Analogues; 2) Stakeholders Summary; 3) Issues with Current Analogue Situation; 4) Current state of Analogues; 5) External Implementation Plan (Second Step); 6) Recent Progress in Utilizing Analogues; 7) Website Layout Example-Home Page; 8) Website Layout Example-Analogue Site; 9) Website Layout Example-Analogue Mission; 10) Objectives of ARDIG Analog Initiatives; 11) Future Plans; 12) Example: Cold-Trap Sample Return; 13) Example: Site Characterization Matrix; 14) Integrated Analogue Studies-Prerequisites for Human Exploration; and 15) Rating Scale Definitions.
CASI
Analogs; Earth Sciences; Mission Planning; Mars Exploration; NASA Space Programs

20070022438 NASA Johnson Space Center, Houston, TX, USA, Mainz Univ., Germany
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface
Fleischer, Iris; Rodionov, D.; Schroeder, C.; Morris, R.; Yen, A.; Ming, D.; McCoy, T.; Mittlefehldt, D.; Gellert, R.; Cohen, B.; Schmidt, M.; Klingelhoefer, Goestar; August 19, 2007; 2 pp.; In English; European Planetary Science Congress 2007, 19-24 August 2007, Potsdam, Germany; Copyright; Avail.: CASI: A01, Hardcopy

The primary MER objectives have been successfully completed. The total integration time of all MB measurements exceeds the duration of the primary 90-sols-mission for Spirit's MB spectrometer, and approaches this value for Opportunity's MB spectrometer. Both MB spectrometers continue to accumulate valuable scientific data after three years of operation (data is available for download [13]) The identification of aqueous minerals such as goethite in Gusev crater and jarosite at Meridiani Planum by the MER Mossbauer spectrometers is strong evidence for past water activity at the two landing sites. Derived from text
Mars Surface; Spectrometers; Mars Roving Vehicles; Planetary Geology

20070022511 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Proposing an International Collaboration on Lightweight Autonomous Vehicles to Conduct Scientific Traverses and Surveys over Antarctica and the Surrounding Sea Ice

Carsey, Frank; Behar, Alberto; July 28, 2004; 7 pp.; In English; Standing Committee on Antarctic Logistics and Operations (SCALOP) XI Symposium, 28 Jul. 2004, Bremen, Germany; Original contains black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: http://hdl.handle.net/2014/40003

We have continued to develop a concept for use of autonomous rovers, originally developed for use in planetary exploration, in polar science on Earth; the concept was the subject of a workshop, and this report summarizes and extends that workshop. The workshop on Antarctic Autonomous Scientific Vehicles and Traverses met at the National Geographic Society on February 14 and 15, 2001 to discuss scientific objectives and benefits of the use of autonomous rovers. The participants enthusiastically viewed rovers as being uniquely valuable for such tasks as data taking on tedious or repetitive routes, traverses in polar night, difficult or hazardous routes, extremely remote regions, routes requiring only simple instrumentation, traverses that must be conducted at low speed, augments of manned traverses, and scientific procedures not compatible with human presence or combustion engines. The workshop has concluded that instrumented autonomous vehicles, of the type being developed for planetary exploration, have the potential to contribute significantly to the way science in conducted in Antarctica while also aiding planetary technology development, and engaging the public's interest. Specific objectives can be supported in understanding ice sheet mass balance, sea ice heat and momentum exchange, and surface air chemistry processes. In the interval since the workshop, we have concluded that organized program to employ such rovers to perform scientific tasks in the Fourth International Polar Year would serve the objectives of that program well.

Author

Antarctic Regions; Autonomy; Sea Ice; Surveys; Surface Vehicles; International Cooperation; Inflatable Structures

20070022571 NASA Johnson Space Center, Houston, TX, USA

Al, Ti, and Cr: Complex Zoning in Synthetic and Natural Nakhlite Pyroxenes

McKay, G.; Le, L.; Mikouchi, T.; June 05, 2007; 2 pp.; In English; 31st Symposium on Antarctic Meteorites, 5-7 June 2007, Tokyo, Japan; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Nakhlites are olivine-bearing clinopyroxene cumulates. The cumulus pyroxenes have cores that are relatively homogeneous in Fe, Mg, and Ca, but show complex zoning of minor elements, especially Al, Ti, and Cr. Zoning patterns contain information about crystallization history parent magma compositions. But it has proven difficult to decipher this information and translate the zoning patterns into petrogenetic processes. This abstract reports results of high-precision Electron Probe MicroAnalysis (EPMA) analysis of synthetic nakhlite pyroxenes run at fO2 from IW to QFM. It compares these with concurrent analyses of natural nakhlite MIL03346 (MIL), and with standardprecision analyses of Y000593 (Y593) collected earlier. Results suggest that (1) different processes are responsible for the zoning of MIL and other more slowly-cooled nakhlites such as Y593, and (2) changes in oxidation conditions during MIL crystallization are not responsible for the unusual Cr zoning pattern

Derived from text

Crystallization; Nakhlites; Pyroxenes; Aluminum; Titanium; Chromium; Meteoritic Composition; Meteorite Parent Bodies

20070022759 NASA Johnson Space Center, Houston, TX, USA

Reducing the Risk of Human Missions to Mars Through Testing

Drake, Bret G.; July 2007; 54 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): 604746.04.01

Report No.(s): JSC-63726; No Copyright; Avail.: CASI: A04, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022759

During the summer of 2002 the NASA Deputy Administrator charted an internal NASA planning group to develop the rationale for exploration beyond low-Earth orbit. This team, termed the Exploration Blueprint, performed architecture analyses to develop roadmaps for how to accomplish the first steps beyond Low-Earth Orbit through the human exploration of Mars. The previous NASA Exploration Team (NEXT) activities laid the foundation and framework for development of NASA s Integrated Space Plan. The reference missions resulting from the analysis performed by the Exploration Blueprint team formed the basis for requirement definition, systems development, technology roadmapping, and risk assessments for future human exploration beyond low-Earth orbit. Emphasis was placed on developing recommendations on what could be done now to effect future exploration activities. The Exploration Blueprint team embraced the Stepping Stone approach to exploration where human and robotic activities are conducted through progressive expansion outward beyond low- Earth orbit. Results

from this study produced a long-term strategy for exploration with near-term implementation plans, program recommendations, and technology investments. Specific results included the development of a common exploration crew vehicle concept, a unified space nuclear strategy, focused bioastronautics research objectives, and an integrated human and robotic exploration strategy. Recommendations from the Exploration Blueprint included the endorsement of the Nuclear Systems Initiative, augmentation of the bioastronautics research, a focused space transportation program including heavy-lift launch and a common exploration vehicle design for ISS and exploration missions, as well as an integrated human and robotic exploration strategy for Mars. Following the results of the Exploration Blueprint study, the NASA Administrator has asked for a recommendation by June, 2003 on the next steps in human and robotic exploration in order to put into context an updated Integrated Space Transportation Plan (post- Columbia) and guide Agency planning. NASA was on the verge of committing significant funding in programs that would be better served if longer term goals were better known including the Orbital Space Plane, research on the ISS, National Aerospace Initiative, Shuttle Life Extension Program, Project Prometheus, as well as a wide range of technology development throughout the Agency. Much of the focus during this period was on integrating the results from the previous studies into more concrete implementation strategies in order to understand the relationship between NASA programs, timing, and resulting budgetary implications. This resulted in an integrated approach including lunar surface operations to retire risk of human Mars missions, maximum use of common and modular systems including what was termed the exploration transfer vehicle, Earth orbit and lunar surface demonstrations of long-life systems, collaboration of human and robotic missions to vastly increase mission return, and high-efficiency transportation systems (nuclear) for deep-space transportation and power. The data provided in this summary viewgraph presentation was developed to begin to address one of the key elements of the emerging implementation strategy, namely how lunar missions help retire risk of human missions to Mars. During this process the scope of the activity broadened into the issue of how testing in general, in various venues including the Moon, can help reduce the risk for Mars missions.

Derived from text

Bioastronautics; Mars Missions; Risk; Technology Assessment; Management Planning; Research Management; Extraterrestrial Environments; Interplanetary Flight; Lunar Programs

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*.

20070022328 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Texas Instruments-Digital Signal Processor(TI-DSP)SMJ320F20 SEL Testing

Sanders, Anthony B.; Poivey, C.; Kim, H. S.; Gee, George B.; September 28, 2006; 7 pp.; In English; 9th Annual International MAPLD (Military and Aerospace Programmable Logic Devices) Conference, 26-28 September 2006, Washington, DC, USA; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy

This viewgraph presentation reviews the testing of the Texas Instrument Digital Signal Processor(TI-DSP)SMJ320F20. Tests were performed to screen for susceptibility to Single Event Latchup (SEL) and measure sensitivity as a function of Linear Energy Transfer (LET) for an application specific test setup. The Heavy Ion Testing of two TI-DSP SMJ320F240 devices experienced Single Event Latchup (SEL) conditions at an LET of 1.8 MeV/(mg/square cm) The devices were exposed from a fluence of 1.76 x l0(exp 3) to 5.00 x 10(exp 6) particles/square cm of the Neon, Argon and Krypton ion beams. For DI(sub DD) an average latchup current occurred at about 700mA, which is a magnitude of 10 over the nominal current of 700mA.

CASI

Ion Beams; Radiation Damage; Ionizing Radiation; Radiation Hazards; Reliability; Acceptability; Orbital Space Tests; Spacecraft Electronic Equipment

20070022613 Barrios Technology, Inc., Houston, TX, USA

The Effects of Radiation on Imagery Sensors in Space

Mathis, Dylan; June 20, 2007; 6 pp.; In English; Eleventh Annual IEEE International Symposium on Consumer Electronics, 20-23 June 2007, Dallas, TX, USA; Original contains color illustrations; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: http://hdl.handle.net/2060/20070022613

Recent experience using high definition video on the International Space Station reveals camera pixel degradation due to particle radiation to be a much more significant problem with high definition cameras than with standard definition video.

Although it may at first appear that increased pixel density on the imager is the logical explanation for this, the ISS implementations of high definition suggest a more complex causal and mediating factor mix. The degree of damage seems to vary from one type of camera to another, and this variation prompts a reconsideration of the possible factors in pixel loss, such as imager size, number of pixels, pixel aperture ratio, imager type (CCD or CMOS), method of error correction/concealment, and the method of compression used for recording or transmission. The problem of imager pixel loss due to particle radiation is not limited to out-of-atmosphere applications. Since particle radiation increases with altitude, it is not surprising to find anecdotal evidence that video cameras subject to many hours of airline travel show an increased incidence of pixel loss. This is even evident in some standard definition video applications, and pixel loss due to particle radiation only stands to become a more salient issue considering the continued diffusion of high definition video cameras in the marketplace.
Author
Imagery; Radiation Effects; Sensors; International Space Station; Video Communication

Subject Term Index

ABLATION

One-Dimensional Ablation with Pyrolysis Gas Flow Using a Full Newton's Method and Finite Control Volume Procedure – 24

ABNORMALITIES

Chromosome Aberrations in Normal and Ataxia-Telangiectasia Cells Exposed to Heavy Ions – 36

AC GENERATORS

Operational Results From a High Power Alternator Test Bed – 22

ACCELERATION (PHYSICS)

Push-Pull Centrifuge Training for the Polish Pilots: Two Years' Experience – 46

ACCEPTABILITY

Implementation of Leak Test Methods for the International Space Station (ISS) Elements, Systems and Components – 11

Integration and Testing Challenges of Small Satellite Missions: Experiences from the Space Technology 5 Project – 10

Texas Instruments-Digital Signal Processor(TI-DSP)SMJ320F20 SEL Testing – 85

The Council on Aviation Accreditation – 3

ACOUSTIC MEASUREMENT

Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

ACOUSTIC PROPERTIES

Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

Cool and Quiet: Partnering to Enhance the Aerodynamic and Acoustic Performance of Installed Electronics Cooling Fans: A White Paper – 79

ADAPTATION

Autonomic Adaptation to a Microgravity-Like Environment in Pregnant Women – 59

Coordinated Switching of Myofilament Protein Isoforms via Gene Regulation and Alternative Splicing during Skeletal Muscle Adaptation – 58

ADAPTIVE CONTROL

Flight Test Results from the NF-15B Intelligent Flight Control System (IFCS) Project with Adaptation to a Simulated Stabilator Failure – 3

ADIPOSE TISSUES

Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

ADRENERGICS

WISE-2005: Adrenergic Responses Before and After 60 Days of 6 Degree Head-Down Bed-Rest in Women – 55

AEROACOUSTICS

Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

Time-Resolved PIV for Space-Time Correlations in Hot Jets – 24

AERODYNAMIC CHARACTERISTICS

Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

AERODYNAMIC DRAG

Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

AERODYNAMIC HEAT TRANSFER

Continued Development of a Global Heat Transfer Measurement System at AEDC Hypervelocity Wind Tunnel 9 – 23

AERODYNAMIC NOISE

Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

Cool and Quiet: Partnering to Enhance the Aerodynamic and Acoustic Performance of Installed Electronics Cooling Fans: A White Paper – 79

AERODYNAMIC STABILITY

Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 6

AERODYNAMICS

Time Series Vegetation Aerodynamic Roughness Fields Estimated from MODIS Observations – 28

AEROELASTIC RESEARCH WINGS

Twist Model Development and Results from the Active Aeroelastic Wing F/A-18 Aircraft – 7

AEROELASTICITY

Twist Model Development and Results from the Active Aeroelastic Wing F/A-18 Aircraft – 7

AERONAUTICS

Journal of Air Transportation, Volume 11, No. 3 – 3

AEROSOLS

Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle – 33

AEROSPACE ENGINEERING

An Update on the Lithium-Ion Cell Low-Earth-Orbit Verification Test Program – 18

Continued Development of a Global Heat Transfer Measurement System at AEDC Hypervelocity Wind Tunnel 9 – 23

Entity-centric Abstraction and Modeling Framework for Transportation Architectures – 4

Integration and Testing Challenges of Small Satellite Missions: Experiences from the Space Technology 5 Project – 10

AEROSPACE ENVIRONMENTS

A Trial for Studying Effects of Gravity on the Fetus – 46

Comparative Analysis of Life Activity of Microoganisms Exposed to Short-Term Spaceflights – 76

Development of an Improved Ground-based Prototype of Space Plant-growing Facility – 40

Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

Foton-M2 Russian/US Biology Experiments - Development, Implementation, and Operations – 9

Heart Rate Reflexes and Arterial Pressure Control after Short-Duration Spaceflight – 70

Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

AEROSPACE MEDICINE

Anesthesia during and Immediately after Spaceflight – 71

Diagnostic Imaging in the Medical Support of the Future Missions to the Moon – 43

Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

Journal of Gravitational Physiology, Volume 13, No. 1 – 45

Non-rigid Medical Image Registration Based on the Thin-plate Spline and Shape Context – 39

Push-Pull Centrifuge Training for the Polish Pilots: Two Years' Experience – 45

Reduction of Body Response after 2G Load by Slow Acceleration – 65

Use of Thermoregulatory Models to Enhance Space Shuttle and Space Station operations and Review of Human Thermoregulatory Control – 44

AEROSPACE SCIENCES

Safe Agents in Space: Lessons from the Autonomous Sciencecraft Experiment – 11

AEROSPACE SYSTEMS
Reuse and Interoperability of Avionics for Space Systems – 7

AEROSPACE VEHICLES
Polymeric Materials for Aerospace Power and Propulsion: Overview of Polymer Research at NASA Glenn – 13

AGRICULTURE
A New Paradigm for Assessing the Role of Agriculture in the Climate System and in Climate Change – 34

Living in Greenhouse Built on Mars – 46

AIR TRAFFIC CONTROL
Relationship of Complexity Factor Ratings with Operational Errors – 2

AIR TRANSPORTATION
A Correlational Study of How Airline Customer Service and Consumer Perception of Airline Customer Service Affect the Air Rage Phenomenon – 4

Data Modeling and Sharing Perspective for Development of a Common Operating Picture – 1

Emergency Preparedness for Catastrophic Events at Small and Medium Sized Airports: Lacking or Not? – 5

Entity-centric Abstraction and Modeling Framework for Transportation Architectures – 4

Human Error: A Concept Analysis – 4

Journal of Air Transportation, Volume 11, No. 3 – 3

Productivity Analysis of Public and Private Airports: A Causal Investigation – 3

The Council on Aviation Accreditation – 3

AIRCRAFT ACCIDENT INVESTIGATION
Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 6

AIRCRAFT ENGINES
High Pressure Low NOx Emissions Research: Recent Progress at NASA Glenn Research Center – 20

Implementation of In-Situ Impedance Techniques on a Full Scale Aero-Engine System – 6

AIRCRAFT INDUSTRY
Emergency Preparedness for Catastrophic Events at Small and Medium Sized Airports: Lacking or Not? – 5

AIRCRAFT MODELS
Entity-centric Abstraction and Modeling Framework for Transportation Architectures – 5

AIRCRAFT NOISE
Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

AIRCRAFT SAFETY
Human Error: A Concept Analysis – 4

AIRLINE OPERATIONS
A Correlational Study of How Airline Customer Service and Consumer Perception of Airline Customer Service Affect the Air Rage Phenomenon – 4

AIRPORTS
Emergency Preparedness for Catastrophic Events at Small and Medium Sized Airports: Lacking or Not? – 5

Productivity Analysis of Public and Private Airports: A Causal Investigation – 3

AIRSPACE
Research Advancement of Superhydrophilic Thin Film in Condensation Heat Regenerators – 75

ALIGNMENT
On Gravity and Grooves – 55

ALUMINUM ALLOYS
Development of Oxidation Resistant Coatings on GRCop-84 Substrates by Cold Spray Process – 18

Sulfur and Moisture Effects on Alumina Scale and TBC Spallation – 15

ALUMINUM OXIDES
Research Advancement of Superhydrophilic Thin Film in Condensation Heat Regenerators – 75

ALUMINUM
Al, Ti, and Cr: Complex Zoning in Synthetic and Natural Nakhlite Pyroxenes – 84

AMAZON REGION (SOUTH AMERICA)
A Behavioral Model of Landscape Change in the Amazon Basin: The Colonist Case – 32

AMPHIBIA
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

ANALOGIES
Development Issues for Lunar Regolith Simulants – 82

Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program – 82

ANALOGS
Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

NASA/ESMD Analogue Mission Plans – 83

ANALYSIS (MATHEMATICS)
CAPRI: A Geometric Foundation for Computational Analysis and Design – 78

ANESTHESIA
Anesthesia during and Immediately after Spaceflight – 71

Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

ANESTHETICS
Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

ANGULAR VELOCITY
Effect of Dry Immersion of Various Durations in Combination with Artificial Stimulation of Foot Support Zones upon Force-Velocity Characteristics of Knee Extensors – 53

ANIMALS
Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 72

Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

ANISOTROPY
Realization of Anisotropic Bone Remodelling Process – 38

ANTARCTIC REGIONS
Proposing an International Collaboration on Lightweight Autonomous Vehicles to Conduct Scientific Traverses and Surveys over Antarctica and the Surrounding Sea Ice – 84

ANTENNA DESIGN
Structural Test and Analysis of a Hybrid Inflatable Antenna – 20

ANTICOAGULANTS
Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment – 42

ANTIOXIDANTS
The State of the Antioxidative System in Pea Plants under Clinorotation – 37

AORTA
Roles of Vestibular and Somatosensory System in Controlling Arterial Pressure during Free Drop-Induced Microgravity – 60

The Activity of Nitric Oxide Synthase may be Altered by Hindlimb Unweighting in Abdominal Aorta of Rats – 72

APOPTOSIS
Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

APPLICATION PROGRAMMING INTERFACE
CAPRI: A Geometric Foundation for Computational Analysis and Design – 78

AQUA SPACECRAFT
Retrievals and Comparisons of Various MODIS-Spectrum Inferred Water Cloud Droplet Effective Radii – 30

ARCHITECTURE
JTRS/SCA and Custom/SDR Waveform Comparison – 10

ARM (ANATOMY)
Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

ARTERIES
Daily 1-H Standing Can Prevent Changes in A0 and ATIR Expressions in Arterial Tissues of Simulated Microgravity Rats – 56

Daily 1-H Standing Can Prevent Changes in Calcium Current of Vascular Myocytes Isolated from Small Mesenteric but not Cerebral Arteries after 3-Day Simulated Microgravity in Rats – 57

Role of the Vestibular System in Arterial Pressure Response to Gravitational Stress – 71

Roles of Vestibular and Somatosensory System in Controlling Arterial Pressure during Free Drop-Induced Microgravity – 59

Study of Arterial Blood Pressure Dynamics in Conscious Rats with the Use of Wavelet Analysis – 58

ASCENT
TDRSS Augmentation for Launch and Ascent High Speed Navigation Filter – 9

ASTRONAUT PERFORMANCE
A Review of Training Methods and Instructional Techniques: Implications for Behavioral Skills Training in U.S. Astronauts – 74

ASTRONAUT TRAINING
A Review of Training Methods and Instructional Techniques: Implications for Behavioral Skills Training in U.S. Astronauts – 74

ASTRONAUTS
Astronaut Risk Levels During Crew Module (CM) Land Landing – 11

ASTROPHYSICS
General Astrophysics with TPF: Not Just Dark Energy – 81

ATAXIA
Chromosome Aberrations in Normal and Ataxia-Telangiectasia Cells Exposed to Heavy Ions – 36

ATMOSPHERIC CHEMISTRY
Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle – 33

ATMOSPHERIC CIRCULATION
Time Series Vegetation Aerodynamic Roughness Fields Estimated from MODIS Observations – 28

ATMOSPHERIC COMPOSITION
2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

ATMOSPHERIC MODELS
Time Series Vegetation Aerodynamic Roughness Fields Estimated from MODIS Observations – 28

ATMOSPHERIC TEMPERATURE
Development of an Improved Ground-based Prototype of Space Plant-growing Facility – 40

ATROPHY
Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 58

Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume – 59

Rat Soleus Muscle Properties and Serum 1GF-1 after Hindlimb Unloading and Reloading – 60

Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Unilateral Lower Limb Suspension Induced Atrophy as a Model of Unweighting – 66

ATTITUDE (INCLINATION)
Impaired Spatial Learning after Hypergravity Load in Rats – 62

AUTOMATIC CONTROL
A Method for Determining Autoignition Temperatures Resulting from Varying Rapid Rise Rates – 28

AUTOMATION
Data Modeling and Sharing Perspective for Development of a Common Operating Picture – 1

AUTONOMY
Proposing an International Collaboration on Lightweight Autonomous Vehicles to Conduct Scientific Traverses and Surveys over Antarctica and the Surrounding Sea Ice – 84

Safe Agents in Space: Lessons from the Autonomous Sciencecraft Experiment – 11

AUXINS
Auxin Polar Transport is Essentially Required for Graviresponse in Early Growth Stage of Etiolated Pea Seedlings – 52

AVIONICS
Repair of Electronics for Long Duration Spaceflight – 8

Reuse and Interoperability of Avionics for Space Systems – 7

AXIAL LOADS
Graphite/Polyimide Composites Subjected to Biaxial Loads at Elevated Temperatures – 15

BACTERIA
Influence of Space Flight Factors on the Genetic Properties of Streptomyces Lividans 66 (PIJ702) – 67

BAROREFLEXES
Baroreflexes and Renal Function – 53

Role of the Vestibular System in Arterial Pressure Response to Gravitational Stress – 71

BED REST
Does a 16-Day Bed-Rest Cause a Deterioration of Executive Function? – 47

Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest – 43

Unilateral Lower Limb Suspension Induced Atrophy as a Model of Unweighting – 66

WISE-2005: Adrenergic Responses Before and After 60 Days of 6 Degree Head-Down Bed-Rest in Women – 55

WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

BENDING FATIGUE
Investigation of Low-Cycle Bending Fatigue of AISI 9310 Steel Spur Gears – 27

BIOASTRONAUTICS
Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

Foton-M2 Russian/US Biology Experiments - Development, Implementation, and Operations – 9

Reducing the Risk of Human Missions to Mars Through Testing – 84

Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

BIOAVAILABILITY
Determination of Scopolamine in Human Saliva Using Solid Phase Extraction and LC/MS/MS – 44

BIOCHEMISTRY
Ground-Based Hypergravity Simulated Modeling Changed the Effects of the Glutamate Transporter Inhibitor on the Carrier-Mediated Glutamate Release in Low [Na+] Media from Rat Brain Nerve Terminals – 70

Long-Term Clinorotation Affects the Amyloplast Structure and Starch Composition in Potato Minitubers – 55

BIOGEOCHEMISTRY
A New Paradigm for Assessing the Role of Agriculture in the Climate System and in Climate Change – 34

BIOINSTRUMENTATION
Oligonucleotide Hybridization Detection Based on Surface Plasmon Resonance Technology – 40

Two-Photon Fluorescence Microscopy for Biomedical Research – 36

BIOLOGICAL EFFECTS
Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery – 65

Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

BIOREACTORS
Human Bone-Forming Chondrocytes Cultured in the Hydrodynamic Focusing Bioreactor Retain Matrix Proteins: Similarities to Spaceflight Results – 62

BIOSYNTHESIS
Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana – 63

Histochemical Research of Brassica Rapa Embryos at the Different Stages of Development under Clinorotation – 61

BLACK HOLES (ASTRONOMY)
Gamma-ray Spectral Characteristics of Thermal and Non-thermal Emission from Three Black Holes – 81

BLOCKING
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 51

BLOOD CELL COUNT
Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

BLOOD CELLS
Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

BLOOD CIRCULATION
Effect of Abdominal or Lower Limb Muscle, Isometric Contraction during Stand Test, on the Portal Venous and Femoral and Cerebral Arterial Hemodynamics – 68

Study of Arterial Blood Pressure Dynamics in Conscious Rats with the Use of Wavelet Analysis – 58

BLOOD FLOW
Effect of Abdominal or Lower Limb Muscle, Isometric Contraction during Stand Test, on the Portal Venous and Femoral and Cerebral Arterial Hemodynamics – 68

Microvascular Branching as a Determinant of Blood Flow by Intravital Particle Imaging Velocimetry – 36

BLOOD PRESSURE
Heart Rate Reflexes and Arterial Pressure Control after Short-Duration Spaceflight – 71

Non-Invasive Tonometric versus invasive Radial Artery Blood Pressure during Altered Gravity Conditions – 49

Study of Arterial Blood Pressure Dynamics in Conscious Rats with the Use of Wavelet Analysis – 58

BLOOD VOLUME
Cerebral Oxygenation Control is Maintained under Push-pull Effect at Low Gz Level Exposure – 50

BLOOD
Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

BODY TEMPERATURE
Reduction of Body Response after 2G Load by Slow Acceleration – 65

BODY WEIGHT
Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest – 43

The Effect of Increasing Mass upon Locomotion – 43

BONE DEMINERALIZATION
Phenotypes, Signaling, and Apoptotic Features of Osteoblasts in Microgravity – 54

Preliminary Research on Effects of Percutaneous Muscular Electrical Stimulation against Bone Loss in Tail-suspended Rats – 41

Space Medicine and Medical Engineering, Vol. 20 No. 1 – 38

Sympathetic Beta Antagonist Prevents Bone Mineral Density Decrease Induced by Labyrinthectomy – 48

BONE MINERAL CONTENT
Change of Bone Mineral and Morphology in Growing Rat Leg Bone after Hindlimb Unloading – 65

Phenotypes, Signaling, and Apoptotic Features of Osteoblasts in Microgravity – 54

Preliminary Research on Effects of Percutaneous Muscular Electrical Stimulation against Bone Loss in Tail-suspended Rats – 41

Sympathetic Beta Antagonist Prevents Bone Mineral Density Decrease Induced by Labyrinthectomy – 48

BONES
Effects of Simulated Weightlessness on the Kinase Activity of MEKl Induced by BMP-2 in Rat Osteosarcoma Cells – 70

Microrheology of Mechanosensitive Bone Cells – 69

Realization of Anisotropic Bone Remodelling Process – 38

BOUNDARY LAYERS
Marine Boundary Layer Cloud Properties From AMF Point Reyes Satellite Observations – 33

BRAIN CIRCULATION
Does a 16-Day Bed-Rest Cause a Deterioration of Executive Function? – 47

Effect of Abdominal or Lower Limb Muscle, Isometric Contraction during Stand Test, on the Portal Venous and Femoral and Cerebral Arterial Hemodynamics – 68

BRAIN
Ground-Based Hypergravity Simulated Modeling Changed the Effects of the Glutamate Transporter Inhibitor on the Carrier-Mediated Glutamate Release in Low [Na+] Media from Rat Brain Nerve Terminals – 70

Study on Homogeneous Head Phantoms Based on Electrical Impedance Tomography – 39

CALCIUM
Daily 1-H Standing Can Prevent Changes in Calcium Current of Vascular Myocytes Isolated from Small Mesenteric but not Cerebral Arteries after 3-Day Simulated Microgravity in Rats – 57

Resting Intracellular Calcium Level as a Triggering Signal for Soleus Fiber Alterations during Unloading – 66

CAPILLARIES (ANATOMY)
Effect of the Lower Body Negative Pressure (LBNP) Test on the Mirocirculation of Healthy Volunteers and Patients with Coronary Artery Disease – 66

CARBON DIOXIDE
2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

CARBON
Performance Characterization and Vibration Testing of 30-cm Carbon-Carbon Ion Optics – 80

CARDIAC VENTRICLES
Evaluation of Changes in Left Ventricular Early Diastolic Mitral Annular Velocity during Parabolic Flight Using Tissue Doppler Echocardiography – 63

CARDIOLOGY
Evaluation of Changes in Left Ventricular Early Diastolic Mitral Annular Velocity during Parabolic Flight Using Tissue Doppler Echocardiography – 63

CARDIOVASCULAR SYSTEM
A Scoring Method for Quantitative Assessment of Cardiovascular Health Status Based on Non-linear Parameters – 42

Autonomic Adaptation to a Microgravity-Like Environment in Pregnant Women – 59

Baroreflexes and Renal Function – 53

Daily 1-H Standing Can Prevent Changes in A0 and ATIR Expressions in Arterial Tissues of Simulated Microgravity Rats – 56

Daily 1-H Standing Can Prevent Changes in Calcium Current of Vascular Myocytes Isolated from Small Mesenteric but not Cerebral Arteries after 3-Day Simulated Microgravity in Rats – 57

Effect of Gravity on the Cardiovascular System – 68

Effect of the Lower Body Negative Pressure (LBNP) Test on the Mirocirculation of Healthy Volunteers and Patients with Coronary Artery Disease – 66

Effects of Intermittent Head-Up Tilt on Endothelin Expression and Morphological Changes of Artery during Simulated Weightlessness in Rabbits – 69

Effects of Self-Generated Lower Body Negative Pressure Training on Cardiovascular Function and Lower Body Negative Pressure Tolerance – 73

Evaluation of Changes in Left Ventricular Early Diastolic Mitral Annular Velocity during Parabolic Flight Using Tissue Doppler Echocardiography – 62

Gravitational Conception of Essential Hypertension – 52

Heart Rate Reflexes and Arterial Pressure Control after Short-Duration Spaceflight – 70

Role of the Vestibular System in Arterial Pressure Response to Gravitational Stress – 71

Space Medicine and Medical Engineering, Vol. 20 No. 1 – 38

WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

CARTILAGE

Human Bone-Forming Chondrocytes Cultured in the Hydrodynamic Focusing Bioreactor Retain Matrix Proteins: Similarities to Spaceflight Results – 62

CELL CULTURING

Cell Culture Tests in the BIOLAB Flight Model – 52

Effect of Simulated Weightlessness on the Expression of CBF 1 Induced by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 64

Human Bone-Forming Chondrocytes Cultured in the Hydrodynamic Focusing Bioreactor Retain Matrix Proteins: Similarities to Spaceflight Results – 61

CELL DIVISION

Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

CELL MEMBRANES (BIOLOGY)

Effects of Hypergravity Stimulus on Primary Xylem Development and Mechanical Properties of Secondary Cell Walls in Inflorescence Stems of Arabidopsis Thaliana L. – 36

Fluidity of Plasma Membranes of Pea Seedling Roots under Clinorotation – 47

Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

CELLS (BIOLOGY)

Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 51

Cell Culture Tests in the BIOLAB Flight Model – 51

Chromosome Aberrations in Normal and Ataxia-Telangiectasia Cells Exposed to Heavy Ions – 35

Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana – 63

Effects of Hypergravity Stimulus on Primary Xylem Development and Mechanical Properties of Secondary Cell Walls in Inflorescence Stems of Arabidopsis Thaliana L. – 36

Effects of Simulated Weightlessness on the Kinase Activity of MEK1 Induced by BMP-2 in Rat Osteosarcoma Cells – 47

Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

Microrheology of Mechanosensitive Bone Cells – 69

Resting Intracellular Calcium Level as a Triggering Signal for Soleus Fiber Alterations during Unloading – 66

Simulated Microgravity Affects the Plant Nucleolar Protein NopA100 – 50

Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

The Effects of Gravity Vector Randomization on Mouse Embryonic Stem Cells in vitro – 51

CENTRAL NERVOUS SYSTEM

Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 54

CEREBELLUM

3D Reconstruction in the Cerebellar Cortex as an Effective Tool to Investigate Neuronal Plasticity – 62

Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 53

CEREBRAL CORTEX

3D Reconstruction in the Cerebellar Cortex as an Effective Tool to Investigate Neuronal Plasticity – 62

Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 53

CEREBRUM

Cerebral Oxygenation Control is Maintained under Push-pull Effect at Low Gz Level Exposure – 50

Does a 16-Day Bed-Rest Cause a Deterioration of Executive Function? – 47

CHARACTERIZATION

Characterization of Kevlar Using Raman Spectroscopy – 17

Characterization of Nonlinear Rate Dependent Response of Shape Memory Polymers – 19

CHROMIUM ALLOYS

Development of Oxidation Resistant Coatings on GRCop-84 Substrates by Cold Spray Process – 18

CHROMIUM

Al, Ti, and Cr: Complex Zoning in Synthetic and Natural Nakhlite Pyroxenes – 84

CHROMOSOME ABERRATIONS

Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis – 45

Chromosome Aberrations in Normal and Ataxia-Telangiectasia Cells Exposed to Heavy Ions – 35

CHROMOSOMES

Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis – 45

CIRCUITS

Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 21

CIVIL AVIATION

Emergency Preparedness for Catastrophic Events at Small and Medium Sized Airports: Lacking or Not? – 5

Gas Emissions Acquired during the Aircraft Particle Emission Experiment (APEX) Series – 31

High Pressure Low NOx Emissions Research: Recent Progress at NASA Glenn Research Center – 19

Journal of Air Transportation, Volume 11, No. 3 – 3

The Council on Aviation Accreditation – 3

CLEARANCES

Comparison of Two Alternate Methods for Tracking Toe Clearance – 74

CLIMATE CHANGE

A New Paradigm for Assessing the Role of Agriculture in the Climate System and in Climate Change – 34

CLIMATOLOGY

An Overview of Climatic Elements – 32

Comparison of TWP-ICE Satellite and Field Campaign Aircraft Derived Cloud Properties – 33

CLINOROTATION
Altered Gravity Effect on the Heat-Shock Protein Level in Plants – 37
Clinorotation Affects the Microtubule Organization in Root Epidermis and Cortex Cells in Brassica Rapa Seedlings – 60
Expression Messenger RNA of Two Cytosolic Small Heat Shock Proteins under Clinorotation – 37
Fluidity of Plasma Membranes of Pea Seedling Roots under Clinorotation – 47
Histochemical Research of Brassica Rapa Embryos at the Different Stages of Development under Clinorotation – 61
Interrelation Between Cytoskeleton Elements in Root Cells of Arabidopsis-GFP-MAP4 Seedlings under Clinorotation – 60
Long-Term Clinorotation Affects the Amyloplast Structure and Starch Composition in Potato Minitubers – 55
The Effects of Clinorotation on the Process of Viral Infection in Potato Plants – 51
The Effects of Gravity Vector Randomization on Mouse Embryonic Stem Cells in vitro – 51
The State of the Antioxidative System in Pea Plants under Clinorotation – 36

CLOUD PHYSICS
A Comparison of Satellite-Based Multilayered Cloud Detection Methods – 33
A New Paradigm for Assessing the Role of Agriculture in the Climate System and in Climate Change – 34
Comparison of TWP-ICE Satellite and Field Campaign Aircraft Derived Cloud Properties – 33
Marine Boundary Layer Cloud Properties From AMF Point Reyes Satellite Observations – 32
Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle – 33

CLOUDS (METEOROLOGY)
A Comparison of Satellite-Based Multilayered Cloud Detection Methods – 33
Comparison of TWP-ICE Satellite and Field Campaign Aircraft Derived Cloud Properties – 33
Retrievals and Comparisons of Various MODIS-Spectrum Inferred Water Cloud Droplet Effective Radii – 29

COATINGS
Coated Fused Silica Fibers for Enhanced Sensitivity Torsion Pendulum – 14

COATING
Development of Oxidation Resistant Coatings on GRCop-84 Substrates by Cold Spray Process – 18

COHERENT RADAR
2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

COLLAGENS
Effects of Simulated Weightlessness on the Kinase Activity of MEKl Induced by BMP-2 in Rat Osteosarcoma Cells – 70

COMMERCIAL AIRCRAFT
Fundamental Technology Development for Gas-Turbine Engine Health Management – 6

COMPATIBILITY
Guide for Oxygen Compatibility Assessments on Oxygen Components and Systems – 27

COMPOSITE MATERIALS
Characterization of Kevlar Using Raman Spectroscopy – 17
Multi-Functional Sandwich Composites for Spacecraft Applications: An Initial Assessment – 17
Weathering of Thermal Control Coatings – 14

COMPOSITE WRAPPING
Composite Overwrap Pressure Vessels: Mechanics and Stress Rupture Lifing Philosophy – 16

COMPRESSING
Improved Thermal Design of a Compression Mold – 16

COMPUTATIONAL FLUID DYNAMICS
High Pressure Low NOx Emissions Research: Recent Progress at NASA Glenn Research Center – 20
Spanwise Wing Loads on the Space Shuttle Orbiter during Roll Maneuver – 24
Twist Model Development and Results from the Active Aeroelastic Wing F/A-18 Aircraft – 7

COMPUTATIONAL GEOMETRY
CAPRI: A Geometric Foundation for Computational Analysis and Design – 78

COMPUTATIONAL GRIDS
Performance Characterization and Vibration Testing of 30-cm Carbon-Carbon Ion Optics – 80

COMPUTER PROGRAMS
A Software Platform for Post-Processing Waveform-Based NDE – 77
CAPRI: A Geometric Foundation for Computational Analysis and Design – 77

COMPUTERIZED SIMULATION
High Altitude Long Endurance Remotely Operated Aircraft - National Airspace System Integration - Simulation IPT: Detailed Airspace Operations Simulation Plan. Version 1.0 – 2
Simulated Microgravity Affects the Plant Nucleolar Protein NopA100 – 50

CONDUCTIVITY
Study on Homogeneous Head Phantoms Based on Electrical Impedance Tomography – 39

CONFERENCES
Journal of Gravitational Physiology, Volume 13, No. 1 – 45

CONSTRUCTION
Environmental Assessment for the Construction and Operation of the Constellation Program A-3 Test Stand – 31

CONSUMERS
A Correlational Study of How Airline Customer Service and Consumer Perception of Airline Customer Service Affect the Air Rage Phenomenon – 4

CONTAMINANTS
High Pressure Low NOx Emissions Research: Recent Progress at NASA Glenn Research Center – 20

CONTROL SYSTEMS DESIGN
Development of Eddy Current Techniques for the Detection of Cracking in Space Shuttle Primary Reaction Control Thrusters – 12

CONTROLLABILITY
Flight Test Results from the NF-15B Intelligent Flight Control System (IFCS) Project with Adaptation to a Simulated Stabilator Failure – 3

CONTROL
Guidance and Control of an Autonomous Soaring UAV – 8

CONVECTION CURRENTS
Guidance and Control of an Autonomous Soaring UAV – 8

CONVECTION
Guidance and Control of an Autonomous Soaring UAV – 8

CONVECTIVE HEAT TRANSFER
Improved Thermal Design of a Compression Mold – 16

CONVERGENCE
Design, Development and Flight Testing of the U.S. Army 4200 sq ft Parafoil Recovery System – 78

CONVERTERS
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

COOLING SYSTEMS
Cool and Quiet: Partnering to Enhance the Aerodynamic and Acoustic Performance of Installed Electronics Cooling Fans: A White Paper – 79

COOLING
Development of Oxidation Resistant Coatings on GRCop-84 Substrates by Cold Spray Process – 18

COPPER ALLOYS
Development of Oxidation Resistant Coatings on GRCop-84 Substrates by Cold Spray Process – 18

CORONARY ARTERY DISEASE
Effect of the Lower Body Negative Pressure (LBNP) Test on the Mirocirculation of Healthy Volunteers and Patients with Coronary Artery Disease – 66

CORRELATION
A Correlational Study of How Airline Customer Service and Consumer Perception of Airline Customer Service Affect the Air Rage Phenomenon – 4

Time-Resolved PIV for Space-Time Correlations in Hot Jets – 24

CORTEXES (BOTANY)
Clinorotation Affects the Microtubule Organization in Root Epidermis and Cortex Cells in Brassica Rapa Seedlings – 60

COSMOLOGY
The Evolution of the Cluster X-ray Scaling Relations in the Wide Angle ROSAT Pointed Survey Sample at – 81

COSTS
A Technical and Cost Perspective on Radiation Testing Challenges – 21

COUNTERMEASURES
Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 58

CRACKING (FRACTURING)
Development of Eddy Current Techniques for the Detection of Cracking in Space Shuttle Primary Reaction Control Thrusters – 12

CRANIUM
Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment – 42

CREEP RUPTURE STRENGTH
Composite Overwrap Pressure Vessels: Mechanics and Stress Rupture Lifing Philosophy – 16

CREW EXPLORATION VEHICLE
Astronaut Risk Levels During Crew Module (CM) Land Landing – 11

Continued Development of a Global Heat Transfer Measurement System at AEDC Hypervelocity Wind Tunnel 9 – 23

Overview of Potable Water Systems on Spacecraft Vehicles and Applications for the Crew Exploration Vehicle (CEV) – 76

Weathering of Thermal Control Coatings – 14

CRYSTALLIZATION
Al, Ti, and Cr: Complex Zoning in Synthetic and Natural Nakhlite Pyroxenes – 84

CULTURE TECHNIQUES
Cell Culture Tests in the BIOLAB Flight Model – 52

CYGNUS CONSTELLATION
Gamma-ray Spectral Characteristics of Thermal and Non-thermal Emission from Three Black Holes – 81

CYTOLOGY
3D Reconstruction in the Cerebellar Cortex as an Effective Tool to Investigate Neuronal Plasticity – 62

Effects of Hypergravity Stimulus on Primary Xylem Development and Mechanical Properties of Secondary Cell Walls in Inflorescence Stems of Arabidopsis Thaliana L. – 36

Interrelation Between Cytoskeleton Elements in Root Cells of Arabidopsis-GFP-MAP4 Seedlings under Clinorotation – 60

Microrheology of Mechanosensitive Bone Cells – 69

The Mechanism and Significance of Gravity Resistance in Plants – 73

DAMAGE ASSESSMENT
Assessing Hurricane Katrina Vegetation Damage at Stennis Space Center using IKONOS Image Classification Techniques – 32

DARK ENERGY
General Astrophysics with TPF: Not Just Dark Energy – 81

DATA PROCESSING
Data Modeling and Sharing Perspective for Development of a Common Operating Picture – 1

DC 8 AIRCRAFT
Gas Emissions Acquired during the Aircraft Particle Emission Experiment (APEX) Series – 31

DECISION SUPPORT SYSTEMS
Design and Implement of the ECLSS Adaptive Learning Intelligent Decision Support System – 75

Space Medicine and Medical Engineering, Vol. 20 No. 1 – 38

DEFECTS
Implementation of Leak Test Methods for the International Space Station (ISS) Elements, Systems and Components – 11

DEFORESTATION
A Behavioral Model of Landscape Change in the Amazon Basin: The Colonist Case – 32

DEGENERATION
Effects of Tenotomy and/or Denervation on the Characteristics of Plantaris Muscle Fibers of MDX Mice – 61

DEOXYRIBONUCLEIC ACID
Comparative Analysis of Life Activity of Microoganisms Exposed to Short-Term Spaceflights – 76

Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

Influence of Space Flight Factors on the Genetic Properties of Streptomyces Lividans 66 (PIJ702) – 67

DEPLOYMENT
Design, Development and Flight Testing of the U.S. Army 4200 sq ft Parafoil Recovery System – 78

DETECTION
2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

A Comparison of Satellite-Based Multilayered Cloud Detection Methods – 33

Development of Eddy Current Techniques for the Detection of Cracking in Space Shuttle Primary Reaction Control Thrusters – 12

Oligonucleotide Hybridization Detection Based on Surface Plasmon Resonance Technology – 40

DETERIORATION
Does a 16-Day Bed-Rest Cause a Deterioration of Executive Function? – 47

DIASTOLE
Evaluation of Changes in Left Ventricular Early Diastolic Mitral Annular Velocity during Parabolic Flight Using Tissue Doppler Echocardiography – 63

DIFFERENTIAL AMPLIFIERS
Design of an Auto-zeroed, Differential, Organic Thin-film Field-effect Transistor Amplifier for Sensor Applications – 23

DIFFUSION FLAMES
Flame Radiation, Structure, and Scalar Properties in Microgravity Laminar Fires – 25

DISORIENTATION
Impaired Spatial Learning after Hypergravity Load in Rats – 62

DIURNAL VARIATIONS
Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle – 34

DROPS (LIQUIDS)
Retrievals and Comparisons of Various MODIS-Spectrum Inferred Water Cloud Droplet Effective Radii – 30

DRYING
A Rapidly Prototyped Vegetation Dryness Index Evaluated for Wildfire Risk Assessment at Stennis Space Center – 29

Effect of Dry Immersion of Various Durations in Combination with Artificial Stimulation of Foot Support Zones upon Force-Velocity Characteristics of Knee Extensors – 53

DYNAMIC CHARACTERISTICS
Relationship of Complexity Factor Ratings with Operational Errors – 2

EARTH ATMOSPHERE
An Overview of Climatic Elements – 32

EARTH OBSERVATIONS (FROM SPACE)
Earth Observations and the Role of UAVs: A Capabilities Assessment – 29

Safe Agents in Space: Lessons from the Autonomous Sciencecraft Experiment – 11

EARTH ORBITS

STAR Concept for Passive Microwave Temperature Sounding from Middle Earth Orbit (MeoSTAR) – 30

EARTH SCIENCES

Earth Observations and the Role of UAVs: A Capabilities Assessment – 29

NASA/ESMD Analogue Mission Plans – 83

EDDY CURRENTS

Development of Eddy Current Techniques for the Detection of Cracking in Space Shuttle Primary Reaction Control Thrusters – 12

EDUCATION

Effects of Self-Generated Lower Body Negative Pressure Training on Cardiovascular Function and Lower Body Negative Pressure Tolerance – 73

Push-Pull Centrifuge Training for the Polish Pilots: Two Years' Experience – 45

The Council on Aviation Accreditation – 3

EFFERENT NERVOUS SYSTEMS

Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

EJECTORS

Experimental Investigation of Unsteady Thrust Augmentation Using a Speaker-Driven Jet – 25

ELECTRIC POTENTIAL

Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 21

ELECTRIC POWER SUPPLIES

Operational Results From a High Power Alternator Test Bed – 22

ELECTRICAL IMPEDANCE

Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment – 42

Study on Homogeneous Head Phantoms Based on Electrical Impedance Tomography – 39

ELECTRICAL RESISTIVITY

Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment – 42

ELECTROCARDIOGRAPHY

A New Wearable System for Cardiorespiratory Monitoring during Gravitational Stress – 49

A Scoring Method for Quantitative Assessment of Cardiovascular Health Status Based on Non-linear Parameters – 42

Design and Implementation of A Portable ECG Monitor for Multi-user – 40

Space Medicine and Medical Engineering, Vol. 20 No. 1 – 38

ELECTROENCEPHALOGRAPHY

Early Face Processing of Internet Addiction Patients by Face-specific N170 – 39

ELECTROMAGNETIC PUMPS

Liquid-Metal Pump Technologies for Nuclear Surface Power – 13

ELECTRONIC EQUIPMENT

Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

ELECTRONICS

Electronic Repair Concepts for Long-Duration Spaceflight – 22

Repair of Electronics for Long Duration Spaceflight – 7

EMBRYOS

Histochemical Research of Brassica Rapa Embryos at the Different Stages of Development under Clinorotation – 61

The Effects of Gravity Vector Randomization on Mouse Embryonic Stem Cells in vitro – 51

EMERGENCIES

Emergency Preparedness for Catastrophic Events at Small and Medium Sized Airports: Lacking or Not? – 5

EMOTIONAL FACTORS

A Review of Training Methods and Instructional Techniques: Implications for Behavioral Skills Training in U.S. Astronauts – 74

ENDOTHELIUM

The Activity of Nitric Oxide Synthase may be Altered by Hindlimb Unweighting in Abdominal Aorta of Rats – 73

ENERGY CONSUMPTION

Guidance and Control of an Autonomous Soaring UAV – 8

ENERGY CONVERSION

The Environmental Performance at Low Intensity, Low Temperature (LILT) of High Efficiency Triple Junction Solar Cells – 23

ENVIRONMENT EFFECTS

Environmental Assessment for the Construction and Operation of the Constellation Program A-3 Test Stand – 31

ENVIRONMENT PROTECTION

Environmental Assessment for the Construction and Operation of the Constellation Program A-3 Test Stand – 31

ENVIRONMENTAL CONTROL

Design and Implement of the ECLSS Adaptive Learning Intelligent Decision Support System – 75

International Space Station Environmental Control and Life Support System Status: 2006 - 2007 – 76

ENVIRONMENTAL QUALITY

Environmental Assessment for the Construction and Operation of the Constellation Program A-3 Test Stand – 31

ENZYME ACTIVITY

Effects of Simulated Weightlessness on the Kinase Activity of MEKl Induced by BMP-2 in Rat Osteosarcoma Cells – 70

Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

EPIDERMIS

Clinorotation Affects the Microtubule Organization in Root Epidermis and Cortex Cells in Brassica Rapa Seedlings – 60

EPITHELIUM

Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis – 45

ERRORS

Human Error: A Concept Analysis – 4

Relationship of Complexity Factor Ratings with Operational Errors – 2

ERYTHROCYTES

Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

Microvascular Branching as a Determinant of Blood Flow by Intravital Particle Imaging Velocimetry – 36

ESTIMATES

Time Series Vegetation Aerodynamic Roughness Fields Estimated from MODIS Observations – 28

ETIOLOGY

Auxin Polar Transport is Essentially Required for Graviresponse in Early Growth Stage of Etiolated Pea Seedlings – 52

EXHAUST EMISSION

Gas Emissions Acquired during the Aircraft Particle Emission Experiment (APEX) Series – 31

High Pressure Low NOx Emissions Research: Recent Progress at NASA Glenn Research Center – 19

EXHAUST GASES

Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

Gas Emissions Acquired during the Aircraft Particle Emission Experiment (APEX) Series – 31

EXHAUST SYSTEMS

Gas Emissions Acquired during the Aircraft Particle Emission Experiment (APEX) Series – 31

EXPERT SYSTEMS

Design and Implement of the ECLSS Adaptive Learning Intelligent Decision Support System – 75

EXPOSURE

Comparative MicroRNA Expression Patterns in Fibroblasts after Low and High Doses of Low-LET Radiation Exposure – 35

Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

EXTRACTION

Determination of Scopolamine in Human Saliva Using Solid Phase Extraction and LC/MS/MS – 44

EXTRATERRESTRIAL ENVIRONMENTS

Reducing the Risk of Human Missions to Mars Through Testing – 85

EXTRATERRESTRIAL RADIATION

Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis – 45

Multi-Functional Sandwich Composites for Spacecraft Applications: An Initial Assessment – 17

EYE (ANATOMY)

Change in Spatial Orientation of Optokinetic Nystagmus and Optokinetic After-Nystagmus in Cats under Side-Down Tilt Conditions – 50

Eye Movements of Flatfish for the Changes of Gravity – 49

The Eye Pursuit Function during Dry Immersion with and without a Compensator of Support Unloading – 63

EYE MOVEMENTS

Eye Movements of Flatfish for the Changes of Gravity – 49

The Eye Pursuit Function during Dry Immersion with and without a Compensator of Support Unloading – 63

F-18 AIRCRAFT

Twist Model Development and Results from the Active Aeroelastic Wing F/A-18 Aircraft – 7

FABRICATION

Design, Fabrication and Performance of Open Source Generation I and II Compliant Hydrodynamic Gas Foil Bearings – 27

Design of an Auto-zeroed, Differential, Organic Thin-film Field-effect Transistor Amplifier for Sensor Applications – 23

FAILURE ANALYSIS

Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 6

FAILURE MODES

Composite Overwrap Pressure Vessels: Mechanics and Stress Rupture Lifing Philosophy – 16

FATIGUE TESTS

Investigation of Low-Cycle Bending Fatigue of AISI 9310 Steel Spur Gears – 27

FAULT TREES

Design and Implement of the ECLSS Adaptive Learning Intelligent Decision Support System – 75

FEET (ANATOMY)

Effect of Dry Immersion of Various Durations in Combination with Artificial Stimulation of Foot Support Zones upon Force-Velocity Characteristics of Knee Extensors – 53

FEMALES

Autonomic Adaptation to a Microgravity-Like Environment in Pregnant Women – 59

WISE-2005: Adrenergic Responses Before and After 60 Days of 6 Degree Head-Down Bed-Rest in Women – 55

WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

FETUSES

A Trial for Studying Effects of Gravity on the Fetus – 46

FIBER COMPOSITES

Characterization of Kevlar Using Raman Spectroscopy – 17

FIBROBLASTS

Comparative MicroRNA Expression Patterns in Fibroblasts after Low and High Doses of Low-LET Radiation Exposure – 35

Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

On Gravity and Grooves – 55

FIELD EFFECT TRANSISTORS

Design of an Auto-zeroed, Differential, Organic Thin-film Field-effect Transistor Amplifier for Sensor Applications – 23

FIELD-PROGRAMMABLE GATE ARRAYS

Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 21

FILM CONDENSATION

Research Advancement of Superhydrophilic Thin Film in Condensation Heat Regenerators – 75

FINGERS

Study on Range of Motion of Manual Performance for Ergonomics Evaluation – 40

FINISHES

Operational Condition and Superfinishing Effect on High-Speed Helical Gearing System Performance – 28

FIRES

Flame Radiation, Structure, and Scalar Properties in Microgravity Laminar Fires – 25

FISHES

Eye Movements of Flatfish for the Changes of Gravity – 49

FISSION

Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 22

FLIGHT CONTROL

Flight Test Results from the NF-15B Intelligent Flight Control System (IFCS) Project with Adaptation to a Simulated Stabilator Failure – 3

The Ground Control Room as an Enabling Technology in the Unmanned Aerial System – 2

FLIGHT OPERATIONS

Data Modeling and Sharing Perspective for Development of a Common Operating Picture – 1

High Altitude Long Endurance Remotely Operated Aircraft - National Airspace System Integration - Simulation IPT: Detailed Airspace Operations Simulation Plan. Version 1.0 – 1

FLIGHT PLANS

High Altitude Long Endurance Remotely Operated Aircraft - National Airspace System Integration - Simulation IPT: Detailed Airspace Operations Simulation Plan. Version 1.0 – 2

FLIGHT SIMULATION

Flight Test Results from the NF-15B Intelligent Flight Control System (IFCS) Project with Adaptation to a Simulated Stabilator Failure – 3

FLIGHT TESTS

Design, Development and Flight Testing of the U.S. Army 4200 sq ft Parafoil Recovery System – 78

Guidance and Control of an Autonomous Soaring UAV – 8

Testing Methods of Push-Pull Effect – 64

FLOW CHAMBERS

Influence of Fluid Shear Stress on Expression of Cbf(alpha)1 in MG-63 Cells Cultured under Simulated Microgravity Condition – 41

FLOW DISTRIBUTION

Microvascular Branching as a Determinant of Blood Flow by Intravital Particle Imaging Velocimetry – 36

FLOW NOISE

Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

FLOW VELOCITY

Microvascular Branching as a Determinant of Blood Flow by Intravital Particle Imaging Velocimetry – 36

FLUID FLOW

Fluidity of Plasma Membranes of Pea Seedling Roots under Clinorotation – 47

FLUIDS

Effect of Simulated Weightlessness on the Expression of CBF 1 Induced by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 64

Effects of Simulated Weightlessness on the Kinase Activity of MEK1 Induced by BMP-2 in Rat Osteosarcoma Cells – 47

Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

FLUORESCENCE

Two-Photon Fluorescence Microscopy for Biomedical Research – 36

FLUORO COMPOUNDS

Whole Body Simulation and Visualization of Metabolic Process of 18F 2-fluoro-2-deoxy-D-glucose – 41

FOIL BEARINGS

Design, Fabrication and Performance of Open Source Generation I and II Compliant Hydrodynamic Gas Foil Bearings – 27

FOREST FIRES

A Rapidly Prototyped Vegetation Dryness Index Evaluated for Wildfire Risk Assessment at Stennis Space Center – 29

FREE-PISTON ENGINES

Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 22

FULL SCALE TESTS

Implementation of In-Situ Impedance Techniques on a Full Scale Aero-Engine System – 6

GAIT

Comparison of Two Alternate Methods for Tracking Toe Clearance – 74

The Effect of Increasing Mass upon Locomotion – 43

GALACTIC CLUSTERS

The Evolution of the Cluster X-ray Scaling Relations in the Wide Angle ROSAT Pointed Survey Sample at – 81

GALACTIC COSMIC RAYS

Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis – 45

GAMETOCYTES

Effects of Modeled Microgravity on Rat Testis – 66

GAMMA RAY SPECTRA

Gamma-ray Spectral Characteristics of Thermal and Non-thermal Emission from Three Black Holes – 81

GAMMA RAYS

Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis – 45

Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

GAS ANALYSIS

Gas Emissions Acquired during the Aircraft Particle Emission Experiment (APEX) Series – 31

Test 6, Test 7, and Gas Standard Analysis Results – 17

GAS BEARINGS

Design, Fabrication and Performance of Open Source Generation I and II Compliant Hydrodynamic Gas Foil Bearings – 27

GAS FLOW

One-Dimensional Ablation with Pyrolysis Gas Flow Using a Full Newton's Method and Finite Control Volume Procedure – 24

GAS TURBINE ENGINES

Fundamental Technology Development for Gas-Turbine Engine Health Management – 6

GEAR TEETH

Investigation of Low-Cycle Bending Fatigue of AISI 9310 Steel Spur Gears – 27

GEARS

Operational Condition and Superfinishing Effect on High-Speed Helical Gearing System Performance – 28

GENE EXPRESSION REGULATION

Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

GENE EXPRESSION

Comparative MicroRNA Expression Patterns in Fibroblasts after Low and High Doses of Low-LET Radiation Exposure – 35

Coordinated Switching of Myofilament Protein Isoforms via Gene Regulation and Alternative Splicing during Skeletal Muscle Adaptation – 58

Daily 1-H Standing Can Prevent Changes in A0 and ATIR Expressions in Arterial Tissues of Simulated Microgravity Rats – 56

Effect of Simulated Weightlessness on the Expression of CBF 1 Induced by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 64

Effects of Simulated Weightlessness on the Kinase Activity of MEK1 Induced by BMP-2 in Rat Osteosarcoma Cells – 47

Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

Influence of Fluid Shear Stress on Expression of Cbf(alpha)1 in MG-63 Cells Cultured under Simulated Microgravity Condition – 41

Microarray Analysis of Hippocampal Gene Expression in Rats Exposed to Hypergravity – 75

Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

GENERAL AVIATION AIRCRAFT

Productivity Analysis of Public and Private Airports: A Causal Investigation – 4

GENERAL OVERVIEWS

An Overview of Climatic Elements – 32

Polymeric Materials for Aerospace Power and Propulsion: Overview of Polymer Research at NASA Glenn – 13

GENES

Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana – 63

Expression Messenger RNA of Two Cytosolic Small Heat Shock Proteins under Clinorotation – 37

Influence of Space Flight Factors on the Genetic Properties of Streptomyces Lividans 66 (PIJ702) – 67

GENETICS

Comparative Analysis of Life Activity of Microoganisms Exposed to Short-Term Spaceflights – 76

GEODESY

International Laser Ranging Service (ILRS) 2003-2004 Annual Report – 29

GLOVES

Study on Range of Motion of Manual Performance for Ergonomics Evaluation – 40

GLUCOSE

Whole Body Simulation and Visualization of Metabolic Process of 18F 2-fluoro-2-deoxy-D-glucose – 41

GLUTAMATES

Ground-Based Hypergravity Simulated Modeling Changed the Effects of the Glutamate Transporter Inhibitor on the Carrier-Mediated Glutamate Release in Low [Na+] Media from Rat Brain Nerve Terminals – 70

GRAPHITE-POLYIMIDE COMPOSITES

Graphite/Polyimide Composites Subjected to Biaxial Loads at Elevated Temperatures – 15

GRAVITATIONAL EFFECTS

A Trial for Studying Effects of Gravity on the Fetus – 46

Altered Gravity Effect on the Heat-Shock Protein Level in Plants – 37

Cerebral Oxygenation Control is Maintained under Push-pull Effect at Low Gz Level Exposure – 50

Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

Effect of Gravity on the Cardiovascular System – 68

Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana – 63

Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

Effects of Hypergravity Stimulus on Primary Xylem Development and Mechanical Properties of Secondary Cell Walls in Inflorescence Stems of Arabidopsis Thaliana L. – 36

Effects of Intermittent Head-Up Tilt on Endothelin Expression and Morphological Changes of Artery during Simulated Weightlessness in Rabbits – 69

Effects of Modeled Microgravity on Rat Testis – 65

Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

Gravitational Conception of Essential Hypertension – 52

Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

Microarray Analysis of Hippocampal Gene Expression in Rats Exposed to Hypergravity – 75

Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

On Gravity and Grooves – 55

Phenotypes, Signaling, and Apoptotic Features of Osteoblasts in Microgravity – 54

Reduction of Body Response after 2G Load by Slow Acceleration – 65

Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

Role of the Vestibular System in Arterial Pressure Response to Gravitational Stress – 71

Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

The Effects of Gravity Vector Randomization on Mouse Embryonic Stem Cells in vitro – 51

WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

GRAVITATIONAL PHYSIOLOGY

A New Wearable System for Cardiorespiratory Monitoring during Gravitational Stress – 49

Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Cerebral Oxygenation Control is Maintained under Push-pull Effect at Low Gz Level Exposure – 50

Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Effect of Abdominal or Lower Limb Muscle, Isometric Contraction during Stand Test, on the Portal Venous and Femoral and Cerebral Arterial Hemodynamics – 68

Effect of Gravity on the Cardiovascular System – 68

Effects of Intermittent Head-Up Tilt on Endothelin Expression and Morphological Changes of Artery during Simulated Weightlessness in Rabbits – 69

Effects of Modeled Microgravity on Rat Testis – 65

Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

Gravitational Conception of Essential Hypertension – 52

Journal of Gravitational Physiology, Volume 13, No. 1 – 45

Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

On Gravity and Grooves – 55

Phenotypes, Signaling, and Apoptotic Features of Osteoblasts in Microgravity – 54

Reduction of Body Response after 2G Load by Slow Acceleration – 65

Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

The Activity of Nitric Oxide Synthase may be Altered by Hindlimb Unweighting in Abdominal Aorta of Rats – 72

GRAVITATION

Eye Movements of Flatfish for the Changes of Gravity – 49

Microarray Analysis of Hippocampal Gene Expression in Rats Exposed to Hypergravity – 75

Reduction of Body Response after 2G Load by Slow Acceleration – 65

GRAVITROPISM

Auxin Polar Transport is Essentially Required for Graviresponse in Early Growth Stage of Etiolated Pea Seedlings – 52

GREENHOUSE EFFECT

Living in Greenhouse Built on Mars – 47

GROOVES

On Gravity and Grooves – 55

GROUND BASED CONTROL

The Ground Control Room as an Enabling Technology in the Unmanned Aerial System – 2

GROUND STATIONS

The Ground Control Room as an Enabling Technology in the Unmanned Aerial System – 2

GROUND TESTS

Design, Development and Flight Testing of the U.S. Army 4200 sq ft Parafoil Recovery System – 78

HEAD DOWN TILT

WISE-2005: Adrenergic Responses Before and After 60 Days of 6 Degree Head-Down Bed-Rest in Women – 55

HEAD UP TILT

Effects of Intermittent Head-Up Tilt on Endothelin Expression and Morphological Changes of Artery during Simulated Weightlessness in Rabbits – 69

HEALTH

A Scoring Method for Quantitative Assessment of Cardiovascular Health Status Based on Non-linear Parameters – 42

HEART FUNCTION

A New Wearable System for Cardiorespiratory Monitoring during Gravitational Stress – 49

Effects of Self-Generated Lower Body Negative Pressure Training on Cardiovascular Function and Lower Body Negative Pressure Tolerance – 73

Evaluation of Changes in Left Ventricular Early Diastolic Mitral Annular Velocity during Parabolic Flight Using Tissue Doppler Echocardiography – 62

WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

HEART RATE

Heart Rate Reflexes and Arterial Pressure Control after Short-Duration Spaceflight – 71

Spectral Analysis of Pulse Transit Time Variability – 42

WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

HEAT RESISTANT ALLOYS

Sulfur and Moisture Effects on Alumina Scale and TBC Spallation – 15

HEAVY IONS

Chromosome Aberrations in Normal and Ataxia-Telangiectasia Cells Exposed to Heavy Ions – 36

HEMATOPOIESIS

Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

HEMODYNAMIC RESPONSES

Effect of Abdominal or Lower Limb Muscle, Isometric Contraction during Stand Test, on the Portal Venous and Femoral and Cerebral Arterial Hemodynamics – 68

Gravitational Conception of Essential Hypertension – 52

Heart Rate Reflexes and Arterial Pressure Control after Short-Duration Spaceflight – 70

HEMOGLOBIN

Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

HEMORRHAGES

Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment – 42

HIGH GRAVITY ENVIRONMENTS

Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana – 63

Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

Effects of Hypergravity Stimulus on Primary Xylem Development and Mechanical Properties of Secondary Cell Walls in Inflorescence Stems of Arabidopsis Thaliana L. – 36

Ground-Based Hypergravity Simulated Modeling Changed the Effects of the Glutamate Transporter Inhibitor on the Carrier-Mediated Glutamate Release in Low [Na+] Media from Rat Brain Nerve Terminals – 70

Impaired Spatial Learning after Hypergravity Load in Rats – 62

Microarray Analysis of Hippocampal Gene Expression in Rats Exposed to Hypergravity – 75

Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 53

Reduction of Body Response after 2G Load by Slow Acceleration – 65

Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

The Mechanism and Significance of Gravity Resistance in Plants – 73

HIGH PRESSURE

High Pressure Low NOx Emissions Research: Recent Progress at NASA Glenn Research Center – 20

HIGH SPEED

Operational Condition and Superfinishing Effect on High-Speed Helical Gearing System Performance – 28

TDRSS Augmentation for Launch and Ascent High Speed Navigation Filter – 9

Testing Methods of Push-Pull Effect – 64

HIGH TEMPERATURE

Graphite/Polyimide Composites Subjected to Biaxial Loads at Elevated Temperatures – 15

HINDLIMB SUSPENSION

Change of Bone Mineral and Morphology in Growing Rat Leg Bone after Hindlimb Unloading – 65

Daily 1-H Standing Can Prevent Changes in Calcium Current of Vascular Myocytes Isolated from Small Mesenteric but not Cerebral Arteries after 3-Day Simulated Microgravity in Rats – 57

Rat Soleus Muscle Properties and Serum 1GF-1 after Hindlimb Unloading and Reloading – 60

Resting Intracellular Calcium Level as a Triggering Signal for Soleus Fiber Alterations during Unloading – 66

Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

HIPPOCAMPUS

Microarray Analysis of Hippocampal Gene Expression in Rats Exposed to Hypergravity – 75

Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

HISTOCHEMICAL ANALYSIS

Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 51

Changes of Mechanotransduction in MG-63 Osteosarcoma Cells Induced by Simulated Weightlessness – 64

Daily 1-H Standing Can Prevent Changes in A0 and ATIR Expressions in Arterial Tissues of Simulated Microgravity Rats – 56

Histochemical Research of Brassica Rapa Embryos at the Different Stages of Development under Clinorotation – 61

Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

Resting Intracellular Calcium Level as a Triggering Signal for Soleus Fiber Alterations during Unloading – 66

HISTOLOGY

Effects of Modeled Microgravity on Rat Testis – 66

HOLMIUM

Highly Efficient Q-switched Ho:YLF Laser Pumped by Tm:Fiber Laser – 26

HUMAN BEINGS

A Trial for Studying Effects of Gravity on the Fetus – 46

Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

HUMAN BODY

Whole Body Simulation and Visualization of Metabolic Process of 18F 2-fluoro-2-deoxy-D-glucose – 41

HUMAN CENTRIFUGES

Push-Pull Centrifuge Training for the Polish Pilots: Two Years' Experience – 46

HUMAN FACTORS ENGINEERING

A Study of Pointing Movement Characteristics and Ergonomics on Front Board – 39

Human Error: A Concept Analysis – 4

Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume – 59

Study on Range of Motion of Manual Performance for Ergonomics Evaluation – 39

HUMAN PERFORMANCE

Human Error: A Concept Analysis – 4

HUMAN REACTIONS

A Correlational Study of How Airline Customer Service and Consumer Perception of Airline Customer Service Affect the Air Rage Phenomenon – 4

Heart Rate Reflexes and Arterial Pressure Control after Short-Duration Spaceflight – 70

HUMAN RESOURCES

Productivity Analysis of Public and Private Airports: A Causal Investigation – 4

HUMIDITY

Development of an Improved Ground-based Prototype of Space Plant-growing Facility – 40

HURRICANES

Assessing Hurricane Katrina Vegetation Damage at Stennis Space Center using IKONOS Image Classification Techniques – 32

HYDRODYNAMICS

Design, Fabrication and Performance of Open Source Generation I and II Compliant Hydrodynamic Gas Foil Bearings – 27

Human Bone-Forming Chondrocytes Cultured in the Hydrodynamic Focusing Bioreactor Retain Matrix Proteins: Similarities to Spaceflight Results – 61

HYOSCINE
Determination of Scopolamine in Human Saliva Using Solid Phase Extraction and LC/MS/MS – 44

HYPERTENSION
Gravitational Conception of Essential Hypertension – 53

Spectral Analysis of Pulse Transit Time Variability – 42

HYPERVELOCITY WIND TUNNELS
Continued Development of a Global Heat Transfer Measurement System at AEDC Hypervelocity Wind Tunnel 9 – 23

IGNITION SYSTEMS
A Method for Determining Autoignition Temperatures Resulting from Varying Rapid Rise Rates – 28

IGNITION TEMPERATURE
A Method for Determining Autoignition Temperatures Resulting from Varying Rapid Rise Rates – 28

IMAGE CLASSIFICATION
Assessing Hurricane Katrina Vegetation Damage at Stennis Space Center using IKONOS Image Classification Techniques – 32

IMAGE PROCESSING
Non-rigid Medical Image Registration Based on the Thin-plate Spline and Shape Context – 39

IMAGE RECONSTRUCTION
3D Reconstruction in the Cerebellar Cortex as an Effective Tool to Investigate Neuronal Plasticity – 62

IMAGE RESOLUTION
Study on Homogeneous Head Phantoms Based on Electrical Impedance Tomography – 39

IMAGERY
The Effects of Radiation on Imagery Sensors in Space – 86

IMAGING TECHNIQUES
A Software Platform for Post-Processing Waveform-Based NDE – 77

Diagnostic Imaging in the Medical Support of the Future Missions to the Moon – 43

Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment – 42

Space Medicine and Medical Engineering, Vol. 20 No. 1 – 38

IMMUNOLOGY
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 51

Changes of Mechanotransduction in MG-63 Osteosarcoma Cells Induced by Simulated Weightlessness – 64

Daily 1-H Standing Can Prevent Changes in A0 and ATIR Expressions in Arterial Tissues of Simulated Microgravity Rats – 56

Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

Resting Intracellular Calcium Level as a Triggering Signal for Soleus Fiber Alterations during Unloading – 66

IMPACT LOADS
The Effect of Increasing Mass upon Locomotion – 43

IMPAIRMENT
Impaired Spatial Learning after Hypergravity Load in Rats – 62

IMPEDANCE MEASUREMENT
Implementation of In-Situ Impedance Techniques on a Full Scale Aero-Engine System – 6

IN SITU MEASUREMENT
Implementation of In-Situ Impedance Techniques on a Full Scale Aero-Engine System – 6

IN SITU RESOURCE UTILIZATION
In-situ Resource Utilization (ISRU) and Lunar Surface Systems – 83

IN VITRO METHODS AND TESTS
The Effects of Gravity Vector Randomization on Mouse Embryonic Stem Cells in vitro – 51

INFLATABLE STRUCTURES
Proposing an International Collaboration on Lightweight Autonomous Vehicles to Conduct Scientific Traverses and Surveys over Antarctica and the Surrounding Sea Ice – 84

Structural Test and Analysis of a Hybrid Inflatable Antenna – 20

IN-FLIGHT MONITORING
The Ground Control Room as an Enabling Technology in the Unmanned Aerial System – 2

IN-FLIGHT SIMULATION
Flight Test Results from the NF-15B Intelligent Flight Control System (IFCS) Project with Adaptation to a Simulated Stabilator Failure – 3

INHIBITORS
Ground-Based Hypergravity Simulated Modeling Changed the Effects of the Glutamate Transporter Inhibitor on the Carrier-Mediated Glutamate Release in Low [Na+] Media from Rat Brain Nerve Terminals – 70

INTENSITY
The Environmental Performance at Low Intensity, Low Temperature (LILT) of High Efficiency Triple Junction Solar Cells – 23

INTERGALACTIC MEDIA
The Evolution of the Cluster X-ray Scaling Relations in the Wide Angle ROSAT Pointed Survey Sample at – 81

INTERLEUKINS
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 51

INTERNATIONAL COOPERATION
Foton-M2 Russian/US Biology Experiments - Development, Implementation, and Operations – 9

Proposing an International Collaboration on Lightweight Autonomous Vehicles to Conduct Scientific Traverses and Surveys over Antarctica and the Surrounding Sea Ice – 84

INTERNATIONAL SPACE STATION
Cell Culture Tests in the BIOLAB Flight Model – 52

Implementation of Leak Test Methods for the International Space Station (ISS) Elements, Systems and Components – 11

International Space Station Environmental Control and Life Support System Status: 2006 - 2007 – 76

Lessons Learned JSC Micro-Wireless Instrumentation Systems on Space Shuttle and International Space Station CANEUS 2006 – 12

Repair of Electronics for Long Duration Spaceflight – 7

The Effects of Radiation on Imagery Sensors in Space – 85

Use of Thermoregulatory Models to Enhance Space Shuttle and Space Station operations and Review of Human Thermoregulatory Control – 44

INTERNETS
Early Face Processing of Internet Addiction Patients by Face-specific N170 – 39

INTEROPERABILITY
Reuse and Interoperability of Avionics for Space Systems – 7

INTERPLANETARY FLIGHT
Reducing the Risk of Human Missions to Mars Through Testing – 85

INTRAOCULAR PRESSURE
Non-Invasive Tonometric versus invasive Radial Artery Blood Pressure during Altered Gravity Conditions – 49

ION BEAMS
Texas Instruments-Digital Signal Processor(TI-DSP)SMJ320F20 SEL Testing – 85

ION ENGINES
Performance Characterization and Vibration Testing of 30-cm Carbon-Carbon Ion Optics – 80

ION OPTICS
Performance Characterization and Vibration Testing of 30-cm Carbon-Carbon Ion Optics – 80

IONIZING RADIATION
Comparative MicroRNA Expression Patterns in Fibroblasts after Low and High Doses of Low-LET Radiation Exposure – 35

Texas Instruments-Digital Signal Processor(TI-DSP)SMJ320F20 SEL Testing – 85

JET FLOW
Experimental Investigation of Unsteady Thrust Augmentation Using a Speaker-Driven Jet – 25

Flame Radiation, Structure, and Scalar Properties in Microgravity Laminar Fires – 25

Time-Resolved PIV for Space-Time Correlations in Hot Jets – 24

JOINTS (ANATOMY)
Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

JUPITER (PLANET)
General Astrophysics with TPF: Not Just Dark Energy – 81

KALMAN FILTERS
TDRSS Augmentation for Launch and Ascent High Speed Navigation Filter – 9

KEVLAR (TRADEMARK)
Characterization of Kevlar Using Raman Spectroscopy – 17

KNEE (ANATOMY)
Effect of Dry Immersion of Various Durations in Combination with Artificial Stimulation of Foot Support Zones upon Force-Velocity Characteristics of Knee Extensors – 53

LABYRINTHECTOMY
Sympathetic Beta Antagonist Prevents Bone Mineral Density Decrease Induced by Labyrinthectomy – 48

LAMINAR FLOW
Flame Radiation, Structure, and Scalar Properties in Microgravity Laminar Fires – 25

LASER PUMPING
Highly Efficient Q-switched Ho:YLF Laser Pumped by Tm:Fiber Laser – 26

LASER RANGING
International Laser Ranging Service (ILRS) 2003-2004 Annual Report – 29

LASERS
2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

LAYERS
Effect of an Opaque Reflecting Layer on the Thermal Behavior of a Thermal Barrier Coating – 16

LEAKAGE
Implementation of Leak Test Methods for the International Space Station (ISS) Elements, Systems and Components – 11

LEG (ANATOMY)
Change of Bone Mineral and Morphology in Growing Rat Leg Bone after Hindlimb Unloading – 65

LIFE SUPPORT SYSTEMS
Design and Implement of the ECLSS Adaptive Learning Intelligent Decision Support System – 75

International Space Station Environmental Control and Life Support System Status: 2006 - 2007 – 76

Overview of Potable Water Systems on Spacecraft Vehicles and Applications for the Crew Exploration Vehicle (CEV) – 76

Space Medicine and Medical Engineering, Vol. 20 No. 1 – 38

LIGNIN
Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana – 63

LIMBS (ANATOMY)
Unilateral Lower Limb Suspension Induced Atrophy as a Model of Unweighting – 67

LINEAR ENERGY TRANSFER (LET)
Summary of LET Requirements/Testing – 80

LIPIDS
Fluidity of Plasma Membranes of Pea Seedling Roots under Clinorotation – 47

LIQUID CRYSTALS
Design and Implementation of A Portable ECG Monitor for Multi-user – 40

LIQUID METALS
Liquid-Metal Pump Technologies for Nuclear Surface Power – 13

LIQUID ROCKET PROPELLANTS
Propellant Gauging for Exploration – 83

LISA (OBSERVATORY)
Coated Fused Silica Fibers for Enhanced Sensitivity Torsion Pendulum – 14

LITHIUM BATTERIES
An Update on the Lithium-Ion Cell Low-Earth-Orbit Verification Test Program – 18

LITHIUM
An Update on the Lithium-Ion Cell Low-Earth-Orbit Verification Test Program – 18

LIZARDS
Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

LOADS (FORCES)
Impaired Spatial Learning after Hypergravity Load in Rats – 62

Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

LOCOMOTION
Comparison of Two Alternate Methods for Tracking Toe Clearance – 74

The Effect of Increasing Mass upon Locomotion – 43

LONG DURATION SPACE FLIGHT
A Review of Training Methods and Instructional Techniques: Implications for Behavioral Skills Training in U.S. Astronauts – 74

Anesthesia during and Immediately after Spaceflight – 71

Electronic Repair Concepts for Long-Duration Spaceflight – 22

Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

Repair of Electronics for Long Duration Spaceflight – 7

LOW EARTH ORBITS
An Update on the Lithium-Ion Cell Low-Earth-Orbit Verification Test Program – 18

LOW TEMPERATURE
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

The Environmental Performance at Low Intensity, Low Temperature (LILT) of High Efficiency Triple Junction Solar Cells – 22

LOWER BODY NEGATIVE PRESSURE
Effect of the Lower Body Negative Pressure (LBNP) Test on the Mirocirculation of Healthy Volunteers and Patients with Coronary Artery Disease – 66

Effects of Self-Generated Lower Body Negative Pressure Training on Cardiovascular Function and Lower Body Negative Pressure Tolerance – 73

WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

LUMBAR REGION
Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery – 65

LUNAR BASED EQUIPMENT
In-situ Resource Utilization (ISRU) and Lunar Surface Systems – 83

LUNAR COMPOSITION
Development Issues for Lunar Regolith Simulants – 82

Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program – 82

LUNAR EXPLORATION
Diagnostic Imaging in the Medical Support of the Future Missions to the Moon – 43

Propellant Gauging for Exploration – 82

LUNAR MARIA
Development Issues for Lunar Regolith Simulants – 82

Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program – 82

LUNAR MINING
In-situ Resource Utilization (ISRU) and Lunar Surface Systems – 83

LUNAR PROGRAMS
Reducing the Risk of Human Missions to Mars Through Testing – 85

LUNAR RANGEFINDING
International Laser Ranging Service (ILRS) 2003-2004 Annual Report – 29

LUNAR RESOURCES
In-situ Resource Utilization (ISRU) and Lunar Surface Systems – 83

Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program – 82

LUNAR ROCKS
Development Issues for Lunar Regolith Simulants – 82

Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program – 82

LUNAR SOIL
Development Issues for Lunar Regolith Simulants – 82

Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program – 82

LUNAR SURFACE
In-situ Resource Utilization (ISRU) and Lunar Surface Systems – 83

MACROPHAGES
Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 68

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

MAGNETIC MATERIALS
Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 22

MAGNETOHYDRODYNAMICS
Liquid-Metal Pump Technologies for Nuclear Surface Power – 13

MAINTENANCE
Electronic Repair Concepts for Long-Duration Spaceflight – 22

Repair of Electronics for Long Duration Spaceflight – 7

MAMMALS
Simulated Microgravity Affects the Plant Nucleolar Protein NopA100 – 50

MAN ENVIRONMENT INTERACTIONS
Environmental Assessment for the Construction and Operation of the Constellation Program A-3 Test Stand – 31

MANAGEMENT PLANNING
Productivity Analysis of Public and Private Airports: A Causal Investigation – 4

Reducing the Risk of Human Missions to Mars Through Testing – 84

MANNED SPACE FLIGHT
Anesthesia during and Immediately after Spaceflight – 71

Design and Implement of the ECLSS Adaptive Learning Intelligent Decision Support System – 75

Electronic Repair Concepts for Long-Duration Spaceflight – 22

International Space Station Environmental Control and Life Support System Status: 2006 - 2007 – 76

Journal of Gravitational Physiology, Volume 13, No. 1 – 45

Use of Thermoregulatory Models to Enhance Space Shuttle and Space Station operations and Review of Human Thermoregulatory Control – 44

MARINE METEOROLOGY
Marine Boundary Layer Cloud Properties From AMF Point Reyes Satellite Observations – 33

Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle – 33

MARS EXPLORATION
NASA/ESMD Analogue Mission Plans – 83

MARS MISSIONS
Reducing the Risk of Human Missions to Mars Through Testing – 85

MARS (PLANET)
Living in Greenhouse Built on Mars – 47

MARS ROVING VEHICLES
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

MARS SURFACE
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

MATHEMATICAL MODELS
Characterization of Nonlinear Rate Dependent Response of Shape Memory Polymers – 19

Composite Overwrap Pressure Vessels: Mechanics and Stress Rupture Lifing Philosophy – 16

Experimental Investigation of Unsteady Thrust Augmentation Using a Speaker-Driven Jet – 25

Graphite/Polyimide Composites Subjected to Biaxial Loads at Elevated Temperatures – 14

Improved Thermal Design of a Compression Mold – 16

Productivity Analysis of Public and Private Airports: A Causal Investigation – 3

Realization of Anisotropic Bone Remodelling Process – 38

Structural Test and Analysis of a Hybrid Inflatable Antenna – 20

Twist Model Development and Results from the Active Aeroelastic Wing F/A-18 Aircraft – 7

Use of Thermoregulatory Models to Enhance Space Shuttle and Space Station operations and Review of Human Thermoregulatory Control – 44

MAZE LEARNING
Impaired Spatial Learning after Hypergravity Load in Rats – 62

MEASURING INSTRUMENTS
Propellant Gauging for Exploration – 83

MECHANICAL ENGINEERING
Design, Fabrication and Performance of Open Source Generation I and II Compliant Hydrodynamic Gas Foil Bearings – 27

Guide for Oxygen Compatibility Assessments on Oxygen Components and Systems – 26

Investigation of Low-Cycle Bending Fatigue of AISI 9310 Steel Spur Gears – 27

MECHANICAL PROPERTIES
Composite Overwrap Pressure Vessels: Mechanics and Stress Rupture Lifing Philosophy – 16

Graphite/Polyimide Composites Subjected to Biaxial Loads at Elevated Temperatures – 14

One-Dimensional Ablation with Pyrolysis Gas Flow Using a Full Newton's Method and Finite Control Volume Procedure – 24

Realization of Anisotropic Bone Remodelling Process – 38

MECHANICS (PHYSICS)
Changes of Mechanotransduction in MG-63 Osteosarcoma Cells Induced by Simulated Weightlessness – 64

Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

MEDICAL SCIENCE
Two-Photon Fluorescence Microscopy for Biomedical Research – 36

MEDICAL SERVICES
Diagnostic Imaging in the Medical Support of the Future Missions to the Moon – 43

MEMBRANES
Fluidity of Plasma Membranes of Pea Seedling Roots under Clinorotation – 47

METABOLISM
Whole Body Simulation and Visualization of Metabolic Process of 18F 2-fluoro-2-deoxy-D-glucose – 41

METAL IONS
An Update on the Lithium-Ion Cell Low-Earth-Orbit Verification Test Program – 18

METEORITE PARENT BODIES
Al, Ti, and Cr: Complex Zoning in Synthetic and Natural Nakhlite Pyroxenes – 84

METEORITIC COMPOSITION
Al, Ti, and Cr: Complex Zoning in Synthetic and Natural Nakhlite Pyroxenes – 84

METEOSAT SATELLITE
A Comparison of Satellite-Based Multilayered Cloud Detection Methods – 33

MICE
Effects of Tenotomy and/or Denervation on the Characteristics of Plantaris Muscle Fibers of MDX Mice – 61

Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

The Effects of Gravity Vector Randomization on Mouse Embryonic Stem Cells in vitro – 51

MICROELECTRONICS
A Technical and Cost Perspective on Radiation Testing Challenges – 21

MICROGRAVITY
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Daily 1-H Standing Can Prevent Changes in A0 and ATIR Expressions in Arterial Tissues of Simulated Microgravity Rats – 56

Daily 1-H Standing Can Prevent Changes in Calcium Current of Vascular Myocytes Isolated from Small Mesenteric but not Cerebral Arteries after 3-Day Simulated Microgravity in Rats – 57

Development of an Improved Ground-based Prototype of Space Plant-growing Facility – 40

Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Does a 16-Day Bed-Rest Cause a Deterioration of Executive Function? – 47

Effect of Gravity on the Cardiovascular System – 68

Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

Effects of Intermittent Head-Up Tilt on Endothelin Expression and Morphological Changes of Artery during Simulated Weightlessness in Rabbits – 69

Effects of Modeled Microgravity on Rat Testis – 65

Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

Flame Radiation, Structure, and Scalar Properties in Microgravity Laminar Fires – 25

Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

Influence of Fluid Shear Stress on Expression of Cbf(alpha)1 in MG-63 Cells Cultured under Simulated Microgravity Condition – 41

Influence of Space Flight Factors on the Genetic Properties of Streptomyces Lividans 66 (PIJ702) – 67

Journal of Gravitational Physiology, Volume 13, No. 1 – 45

Phenotypes, Signaling, and Apoptotic Features of Osteoblasts in Microgravity – 54

Push-Pull Centrifuge Training for the Polish Pilots: Two Years' Experience – 45

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

Roles of Vestibular and Somatosensory System in Controlling Arterial Pressure during Free Drop-Induced Microgravity – 59

Simulated Microgravity Affects the Plant Nucleolar Protein NopA100 – 50

The Activity of Nitric Oxide Synthase may be Altered by Hindlimb Unweighting in Abdominal Aorta of Rats – 72

The Effects of Clinorotation on the Process of Viral Infection in Potato Plants – 51

Unilateral Lower Limb Suspension Induced Atrophy as a Model of Unweighting – 66

MICROINSTRUMENTATION
Lessons Learned JSC Micro-Wireless Instrumentation Systems on Space Shuttle and International Space Station CANEUS 2006 – 12

MICROORGANISMS
Comparative Analysis of Life Activity of Microoganisms Exposed to Short-Term Spaceflights – 76

MICROSCOPY
Two-Photon Fluorescence Microscopy for Biomedical Research – 36

MICROSTRUCTURE
Characterization of Nonlinear Rate Dependent Response of Shape Memory Polymers – 19

MICROWAVE RADIOMETERS
STAR Concept for Passive Microwave Temperature Sounding from Middle Earth Orbit (MeoSTAR) – 30

MICROWAVE SOUNDING
STAR Concept for Passive Microwave Temperature Sounding from Middle Earth Orbit (MeoSTAR) – 30

MISSION PLANNING
NASA/ESMD Analogue Mission Plans – 83

MODELS
A Behavioral Model of Landscape Change in the Amazon Basin: The Colonist Case – 32

Data Modeling and Sharing Perspective for Development of a Common Operating Picture – 1

Unilateral Lower Limb Suspension Induced Atrophy as a Model of Unweighting – 66

MODIS (RADIOMETRY)
A Comparison of Satellite-Based Multilayered Cloud Detection Methods – 33

Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

Retrievals and Comparisons of Various MODIS-Spectrum Inferred Water Cloud Droplet Effective Radii – 29

Time Series Vegetation Aerodynamic Roughness Fields Estimated from MODIS Observations – 28

MOISTURE CONTENT
Development of an Improved Ground-based Prototype of Space Plant-growing Facility – 40

MOISTURE
Sulfur and Moisture Effects on Alumina Scale and TBC Spallation – 15

MOLDS
Improved Thermal Design of a Compression Mold – 16

MOLECULAR BIOLOGY
Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 54

MOMENTUM TRANSFER
Time Series Vegetation Aerodynamic Roughness Fields Estimated from MODIS Observations – 28

MORPHOLOGY
Change of Bone Mineral and Morphology in Growing Rat Leg Bone after Hindlimb Unloading – 65

Effects of Simulated Weightlessness on the Kinase Activity of MEKI Induced by BMP-2 in Rat Osteosarcoma Cells – 70

Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 53

MOTION SICKNESS DRUGS
Determination of Scopolamine in Human Saliva Using Solid Phase Extraction and LC/MS/MS – 44

MOTORS
Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume – 59

MUSCLE CELLS
Daily 1-H Standing Can Prevent Changes in Calcium Current of Vascular Myocytes Isolated from Small Mesenteric but not Cerebral Arteries after 3-Day Simulated Microgravity in Rats – 57

MUSCLE FIBERS
Effects of Tenotomy and/or Denervation on the Characteristics of Plantaris Muscle Fibers of MDX Mice – 61

Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

Rat Soleus Muscle Properties and Serum 1GF-1 after Hindlimb Unloading and Reloading – 60

Resting Intracellular Calcium Level as a Triggering Signal for Soleus Fiber Alterations during Unloading – 66

Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

MUSCLES
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 51

Coordinated Switching of Myofilament Protein Isoforms via Gene Regulation and Alternative Splicing during Skeletal Muscle Adaptation – 58

Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume – 59

Preliminary Research on Effects of Percutaneous Muscular Electrical Stimulation against Bone Loss in Tail-suspended Rats – 41

Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

MUSCULAR FUNCTION
Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery – 65

Effect of Abdominal or Lower Limb Muscle, Isometric Contraction during Stand Test, on the Portal Venous and Femoral and Cerebral Arterial Hemodynamics – 68

Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

MUSCULOSKELETAL SYSTEM
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Coordinated Switching of Myofilament Protein Isoforms via Gene Regulation and Alternative Splicing during Skeletal Muscle Adaptation – 58

Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest – 43

Unilateral Lower Limb Suspension Induced Atrophy as a Model of Unweighting – 66

MYOSINS
Coordinated Switching of Myofilament Protein Isoforms via Gene Regulation and Alternative Splicing during Skeletal Muscle Adaptation – 58

NAKHLITES
Al, Ti, and Cr: Complex Zoning in Synthetic and Natural Nakhlite Pyroxenes – 84

NANOTECHNOLOGY
Polymeric Materials for Aerospace Power and Propulsion: Overview of Polymer Research at NASA Glenn – 13

NASA PROGRAMS
Flight Test Results from the NF-15B Intelligent Flight Control System (IFCS) Project with Adaptation to a Simulated Stabilator Failure – 3

Foton-M2 Russian/US Biology Experiments - Development, Implementation, and Operations – 9

NASA SPACE PROGRAMS
NASA/ESMD Analogue Mission Plans – 83

NATIONAL AIRSPACE SYSTEM
Data Modeling and Sharing Perspective for Development of a Common Operating Picture – 1

High Altitude Long Endurance Remotely Operated Aircraft - National Airspace System Integration - Simulation IPT: Detailed Airspace Operations Simulation Plan. Version 1.0 – 1

NAVIGATION INSTRUMENTS
TDRSS Augmentation for Launch and Ascent High Speed Navigation Filter – 9

NECROSIS
Effects of Tenotomy and/or Denervation on the Characteristics of Plantaris Muscle Fibers of MDX Mice – 61

NEPTUNE (PLANET)
General Astrophysics with TPF: Not Just Dark Energy – 81

NERVES
Effects of Tenotomy and/or Denervation on the Characteristics of Plantaris Muscle Fibers of MDX Mice – 61

Ground-Based Hypergravity Simulated Modeling Changed the Effects of the Glutamate Transporter Inhibitor on the Carrier-Mediated Glutamate Release in Low [Na+] Media from Rat Brain Nerve Terminals – 70

NEURAL NETS
Design and Implement of the ECLSS Adaptive Learning Intelligent Decision Support System – 75

NEUROLOGY
Does a 16-Day Bed-Rest Cause a Deterioration of Executive Function? – 47

NEURONS
3D Reconstruction in the Cerebellar Cortex as an Effective Tool to Investigate Neuronal Plasticity – 62

Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery – 65

NEUROPHYSIOLOGY
Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

NEUTRON BEAMS
Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis – 45

NEWTON METHODS
One-Dimensional Ablation with Pyrolysis Gas Flow Using a Full Newton's Method and Finite Control Volume Procedure – 24

NIOBIUM ALLOYS
Development of Oxidation Resistant Coatings on GRCop-84 Substrates by Cold Spray Process – 18

NITRIC OXIDE
The Activity of Nitric Oxide Synthase may be Altered by Hindlimb Unweighting in Abdominal Aorta of Rats – 73

NITROGEN OXIDES
High Pressure Low NOx Emissions Research: Recent Progress at NASA Glenn Research Center – 20

NOISE REDUCTION
Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

Cool and Quiet: Partnering to Enhance the Aerodynamic and Acoustic Performance of Installed Electronics Cooling Fans: A White Paper – 79

NONDESTRUCTIVE TESTS
A Software Platform for Post-Processing Waveform-Based NDE – 77

NONLINEARITY
A Scoring Method for Quantitative Assessment of Cardiovascular Health Status Based on Non-linear Parameters – 42

Characterization of Nonlinear Rate Dependent Response of Shape Memory Polymers – 19

NUCLEIC ACIDS
Oligonucleotide Hybridization Detection Based on Surface Plasmon Resonance Technology – 40

NUCLEI
Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

NUCLEONS
Simulated Microgravity Affects the Plant Nucleolar Protein NopA100 – 50

NUMERICAL INTEGRATION
An Improved Transformation and Optimized Sampling Scheme for the Numerical Evaluation of Singular and Near-Singular Potentials – 78

NYSTAGMUS
Change in Spatial Orientation of Optokinetic Nystagmus and Optokinetic After-Nystagmus in Cats under Side-Down Tilt Conditions – 50

OBJECT-ORIENTED PROGRAMMING
CAPRI: A Geometric Foundation for Computational Analysis and Design – 78

ODORS
Test 6, Test 7, and Gas Standard Analysis Results – 17

OLIGONUCLEOTIDES
Oligonucleotide Hybridization Detection Based on Surface Plasmon Resonance Technology – 40

ONBOARD DATA PROCESSING
Safe Agents in Space: Lessons from the Autonomous Sciencecraft Experiment – 11

ONBOARD EQUIPMENT
Repair of Electronics for Long Duration Spaceflight – 8

ONTOGENY
Sea Urchin Development Test in the BIOLAB Flight Model – 37

OPERATING TEMPERATURE
Development of an Improved Ground-based Prototype of Space Plant-growing Facility – 40

OPHTHALMOLOGY
The Eye Pursuit Function during Dry Immersion with and without a Compensator of Support Unloading – 63

OPTICAL PROPERTIES
Weathering of Thermal Control Coatings – 14

OPTICAL RADAR
2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

OPTICAL THICKNESS
Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

OPTIMIZATION
An Improved Transformation and Optimized Sampling Scheme for the Numerical Evaluation of Singular and Near-Singular Potentials – 78

ORBITAL SPACE TESTS
Texas Instruments-Digital Signal Processor(TI-DSP)SMJ320F20 SEL Testing – 85

ORGANELLES
Long-Term Clinorotation Affects the Amyloplast Structure and Starch Composition in Potato Minitubers – 55

ORGANISMS
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

ORTHOSTATIC TOLERANCE
Effects of Self-Generated Lower Body Negative Pressure Training on Cardiovascular Function and Lower Body Negative Pressure Tolerance – 73

OSTEOBLASTS
Changes of Mechanotransduction in MG-63 Osteosarcoma Cells Induced by Simulated Weightlessness – 64

Effect of Simulated Weightlessness on the Expression of CBF 1 Induced by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 64

Effects of Simulated Weightlessness on the Kinase Activity of MEK1 Induced by BMP-2 in Rat Osteosarcoma Cells – 47

Effects of Simulated Weightlessness on the Kinase Activity of MEKl Induced by BMP-2 in Rat Osteosarcoma Cells – 70

Phenotypes, Signaling, and Apoptotic Features of Osteoblasts in Microgravity – 54

OSTEOGENESIS
Human Bone-Forming Chondrocytes Cultured in the Hydrodynamic Focusing Bioreactor Retain Matrix Proteins: Similarities to Spaceflight Results – 62

Microrheology of Mechanosensitive Bone Cells – 69

OSTEOPOROSIS
Preliminary Research on Effects of Percutaneous Muscular Electrical Stimulation against Bone Loss in Tail-suspended Rats – 41

OXIDATION RESISTANCE
Development of Oxidation Resistant Coatings on GRCop-84 Substrates by Cold Spray Process – 18

OXIDATION
Development of Oxidation Resistant Coatings on GRCop-84 Substrates by Cold Spray Process – 18

OXYGEN SUPPLY EQUIPMENT
Guide for Oxygen Compatibility Assessments on Oxygen Components and Systems – 27

OXYGENATION
Cerebral Oxygenation Control is Maintained under Push-pull Effect at Low Gz Level Exposure – 50

OXYGEN
Guide for Oxygen Compatibility Assessments on Oxygen Components and Systems – 27

Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

The State of the Antioxidative System in Pea Plants under Clinorotation – 36

PARAFOILS
Design, Development and Flight Testing of the U.S. Army 4200 sq ft Parafoil Recovery System – 78

PARAMETERIZATION
Effect of an Opaque Reflecting Layer on the Thermal Behavior of a Thermal Barrier Coating – 16

PARTICLE IMAGE VELOCIMETRY
Microvascular Branching as a Determinant of Blood Flow by Intravital Particle Imaging Velocimetry – 36

Time-Resolved PIV for Space-Time Correlations in Hot Jets – 24

PATIENTS
Early Face Processing of Internet Addiction Patients by Face-specific N170 – 39

PAYLOADS
Design, Development and Flight Testing of the U.S. Army 4200 sq ft Parafoil Recovery System – 78

Integration and Testing Challenges of Small Satellite Missions: Experiences from the Space Technology 5 Project – 10

PENDULUMS
Coated Fused Silica Fibers for Enhanced Sensitivity Torsion Pendulum – 14

PERFORMANCE PREDICTION
Performance Characterization and Vibration Testing of 30-cm Carbon-Carbon Ion Optics – 80

PERFORMANCE TESTS
Implementation of Leak Test Methods for the International Space Station (ISS) Elements, Systems and Components – 11

Integration and Testing Challenges of Small Satellite Missions: Experiences from the Space Technology 5 Project – 10

Study on Range of Motion of Manual Performance for Ergonomics Evaluation – 39

PERIPHERAL NERVOUS SYSTEM
Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 54

PERMANENT MAGNETS
Operational Results From a High Power Alternator Test Bed – 22

PERMEABILITY
Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

PHARMACOLOGY
Determination of Scopolamine in Human Saliva Using Solid Phase Extraction and LC/MS/MS – 44

Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

PHENOTYPE
Phenotypes, Signaling, and Apoptotic Features of Osteoblasts in Microgravity – 54

PHOTONS
Two-Photon Fluorescence Microscopy for Biomedical Research – 36

PHYSICAL EXERCISE
Autonomic Adaptation to a Microgravity-Like Environment in Pregnant Women – 59

Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

The Effect of Increasing Mass upon Locomotion – 43

WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

PHYSIOLOGICAL EFFECTS
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Anesthesia during and Immediately after Spaceflight – 71

Change in Spatial Orientation of Optokinetic Nystagmus and Optokinetic After-Nystagmus in Cats under Side-Down Tilt Conditions – 50

Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery – 65

Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

Effect of Gravity on the Cardiovascular System – 68

Effects of Intermittent Head-Up Tilt on Endothelin Expression and Morphological Changes of Artery during Simulated Weightlessness in Rabbits – 69

Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

Heart Rate Reflexes and Arterial Pressure Control after Short-Duration Spaceflight – 70

Influence of Space Flight Factors on the Genetic Properties of Streptomyces Lividans 66 (PIJ702) – 67

Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

The Activity of Nitric Oxide Synthase may be Altered by Hindlimb Unweighting in Abdominal Aorta of Rats – 72

PHYSIOLOGICAL RESPONSES
Effect of Gravity on the Cardiovascular System – 68

Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest – 43

Reduction of Body Response after 2G Load by Slow Acceleration – 65

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

PHYSIOLOGY
Spectral Analysis of Pulse Transit Time Variability – 42

PILOTLESS AIRCRAFT
Earth Observations and the Role of UAVs: A Capabilities Assessment – 29

Guidance and Control of an Autonomous Soaring UAV – 8

The Ground Control Room as an Enabling Technology in the Unmanned Aerial System – 2

PLANETARY GEOLOGY
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

PLANETARY PROTECTION
Living in Greenhouse Built on Mars – 47

PLANT ROOTS
Clinorotation Affects the Microtubule Organization in Root Epidermis and Cortex Cells in Brassica Rapa Seedlings – 60

Fluidity of Plasma Membranes of Pea Seedling Roots under Clinorotation – 47

Interrelation Between Cytoskeleton Elements in Root Cells of Arabidopsis-GFP-MAP4 Seedlings under Clinorotation – 60

PLANTS (BOTANY)
Auxin Polar Transport is Essentially Required for Graviresponse in Early Growth Stage of Etiolated Pea Seedlings – 52

Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana – 63

Effects of Hypergravity Stimulus on Primary Xylem Development and Mechanical Properties of Secondary Cell Walls in Inflorescence Stems of Arabidopsis Thaliana L. – 36

Histochemical Research of Brassica Rapa Embryos at the Different Stages of Development under Clinorotation – 61

Interrelation Between Cytoskeleton Elements in Root Cells of Arabidopsis-GFP-MAP4 Seedlings under Clinorotation – 60

Living in Greenhouse Built on Mars – 46

Long-Term Clinorotation Affects the Amyloplast Structure and Starch Composition in Potato Minitubers – 55

Simulated Microgravity Affects the Plant Nucleolar Protein NopA100 – 50

The Effects of Clinorotation on the Process of Viral Infection in Potato Plants – 51

The Mechanism and Significance of Gravity Resistance in Plants – 73

The State of the Antioxidative System in Pea Plants under Clinorotation – 36

PLASMA COMPOSITION
Fluidity of Plasma Membranes of Pea Seedling Roots under Clinorotation – 47

PLASMAS (PHYSICS)
Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

PLASTIC PROPERTIES
3D Reconstruction in the Cerebellar Cortex as an Effective Tool to Investigate Neuronal Plasticity – 62

POLYIMIDE RESINS
Graphite/Polyimide Composites Subjected to Biaxial Loads at Elevated Temperatures – 15

POLYMER MATRIX COMPOSITES
Polymeric Materials for Aerospace Power and Propulsion: Overview of Polymer Research at NASA Glenn – 13

POLYMERS
Characterization of Kevlar Using Raman Spectroscopy – 17

Characterization of Nonlinear Rate Dependent Response of Shape Memory Polymers – 19

Improved Thermal Design of a Compression Mold – 16

POTABLE WATER
Overview of Potable Water Systems on Spacecraft Vehicles and Applications for the Crew Exploration Vehicle (CEV) – 76

POTATOES
Long-Term Clinorotation Affects the Amyloplast Structure and Starch Composition in Potato Minitubers – 55

The Effects of Clinorotation on the Process of Viral Infection in Potato Plants – 51

POWDER (PARTICLES)
A Method for Determining Autoignition Temperatures Resulting from Varying Rapid Rise Rates – 28

POWER CONVERTERS
Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 22

POWER SUPPLY CIRCUITS
Operational Results From a High Power Alternator Test Bed – 22

PRECIPITATION (METEOROLOGY)
An Overview of Climatic Elements – 32

PREDICTIONS
Relationship of Complexity Factor Ratings with Operational Errors – 2

PREGNANCY
Autonomic Adaptation to a Microgravity-Like Environment in Pregnant Women – 59

PRESSURE GAGES
Non-Invasive Tonometric versus invasive Radial Artery Blood Pressure during Altered Gravity Conditions – 49

PRESSURE MEASUREMENT
Non-Invasive Tonometric versus invasive Radial Artery Blood Pressure during Altered Gravity Conditions – 49

PRESSURE VESSELS
Composite Overwrap Pressure Vessels: Mechanics and Stress Rupture Lifing Philosophy – 16

PRESSURE
Roles of Vestibular and Somatosensory System in Controlling Arterial Pressure during Free Drop-Induced Microgravity – 60

PRINCIPAL COMPONENTS ANALYSIS
Relationship of Complexity Factor Ratings with Operational Errors – 2

PROBES
Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume – 59

PRODUCTIVITY
Productivity Analysis of Public and Private Airports: A Causal Investigation – 4

PROPELLANT TANKS
Propellant Gauging for Exploration – 83

PROTEINS
Altered Gravity Effect on the Heat-Shock Protein Level in Plants – 37

Coordinated Switching of Myofilament Protein Isoforms via Gene Regulation and Alternative Splicing during Skeletal Muscle Adaptation – 58

Effects of Simulated Weightlessness on the Kinase Activity of MEKl Induced by BMP-2 in Rat Osteosarcoma Cells – 70

Expression Messenger RNA of Two Cytosolic Small Heat Shock Proteins under Clinorotation – 37

Human Bone-Forming Chondrocytes Cultured in the Hydrodynamic Focusing Bioreactor Retain Matrix Proteins: Similarities to Spaceflight Results – 61

Simulated Microgravity Affects the Plant Nucleolar Protein NopA100 – 50

PROTOTYPES
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 5

PSYCHOLOGICAL FACTORS
A Review of Training Methods and Instructional Techniques: Implications for Behavioral Skills Training in U.S. Astronauts – 74

PSYCHOPHYSIOLOGY
Does a 16-Day Bed-Rest Cause a Deterioration of Executive Function? – 47

PULSE COMMUNICATION
Design and Implementation of A Portable ECG Monitor for Multi-user – 40

PULSEJET ENGINES
Experimental Investigation of Unsteady Thrust Augmentation Using a Speaker-Driven Jet – 25

PYROLYSIS
One-Dimensional Ablation with Pyrolysis Gas Flow Using a Full Newton's Method and Finite Control Volume Procedure – 24

PYROTECHNICS
A Method for Determining Autoignition Temperatures Resulting from Varying Rapid Rise Rates – 28

PYROXENES
Al, Ti, and Cr: Complex Zoning in Synthetic and Natural Nakhlite Pyroxenes – 84

Q SWITCHED LASERS
Highly Efficient Q-switched Ho:YLF Laser Pumped by Tm:Fiber Laser – 26

RADIATION DAMAGE
Texas Instruments-Digital Signal Processor(TI-DSP)SMJ320F20 SEL Testing – 85

RADIATION DOSAGE
Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis – 45

Chromosome Aberrations in Normal and Ataxia-Telangiectasia Cells Exposed to Heavy Ions – 35

Comparative MicroRNA Expression Patterns in Fibroblasts after Low and High Doses of Low-LET Radiation Exposure – 34

Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

RADIATION EFFECTS
A Technical and Cost Perspective on Radiation Testing Challenges – 21

Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 21

The Effects of Radiation on Imagery Sensors in Space – 85

RADIATION HARDENING
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

RADIATION HAZARDS
Texas Instruments-Digital Signal Processor(TI-DSP)SMJ320F20 SEL Testing – 85

RADIATION SHIELDING
Multi-Functional Sandwich Composites for Spacecraft Applications: An Initial Assessment – 17

RADIATION TRANSPORT
Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

RADIATION
Flame Radiation, Structure, and Scalar Properties in Microgravity Laminar Fires – 25

RADII
Retrievals and Comparisons of Various MODIS-Spectrum Inferred Water Cloud Droplet Effective Radii – 30

RADIO COMMUNICATION
JTRS/SCA and Custom/SDR Waveform Comparison – 10

RADIOISOTOPE HEAT SOURCES
An Overview and Status of NASA's Radioisotope Power Conversion Technology NRA – 13

RADIOMETERS
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

RAMAN SPECTROSCOPY
Characterization of Kevlar Using Raman Spectroscopy – 17

RAPID PROTOTYPING
A Rapidly Prototyped Vegetation Dryness Index Evaluated for Wildfire Risk Assessment at Stennis Space Center – 29

RATS
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 51

Change of Bone Mineral and Morphology in Growing Rat Leg Bone after Hindlimb Unloading – 65

Daily 1-H Standing Can Prevent Changes in A0 and ATIR Expressions in Arterial Tissues of Simulated Microgravity Rats – 56

Daily 1-H Standing Can Prevent Changes in Calcium Current of Vascular Myocytes Isolated from Small Mesenteric but not Cerebral Arteries after 3-Day Simulated Microgravity in Rats – 57

Effects of Modeled Microgravity on Rat Testis – 65

Effects of Simulated Weightlessness on the Kinase Activity of MEKI Induced by BMP-2 in Rat Osteosarcoma Cells – 70

Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

Impaired Spatial Learning after Hypergravity Load in Rats – 62

Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

Microarray Analysis of Hippocampal Gene Expression in Rats Exposed to Hypergravity – 75

Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

Preliminary Research on Effects of Percutaneous Muscular Electrical Stimulation against Bone Loss in Tail-suspended Rats – 41

Rat Soleus Muscle Properties and Serum 1GF-1 after Hindlimb Unloading and Reloading – 60

Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

Study of Arterial Blood Pressure Dynamics in Conscious Rats with the Use of Wavelet Analysis – 58

REACTION CONTROL
Development of Eddy Current Techniques for the Detection of Cracking in Space Shuttle Primary Reaction Control Thrusters – 12

REACTION KINETICS
The Effect of Increasing Mass upon Locomotion – 43

RED SHIFT
The Evolution of the Cluster X-ray Scaling Relations in the Wide Angle ROSAT Pointed Survey Sample at – 81

REFLECTION
Effect of an Opaque Reflecting Layer on the Thermal Behavior of a Thermal Barrier Coating – 16

REGENERATION (PHYSIOLOGY)
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

REGENERATORS
Research Advancement of Superhydrophilic Thin Film in Condensation Heat Regenerators – 75

REGIONS
Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

REGOLITH
Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program – 82

REGRESSION ANALYSIS
Comparison of Two Alternate Methods for Tracking Toe Clearance – 74

Relationship of Complexity Factor Ratings with Operational Errors – 2

RELIABILITY
Texas Instruments-Digital Signal Processor(TI-DSP)SMJ320F20 SEL Testing – 85

REMOTE SENSING
A Rapidly Prototyped Vegetation Dryness Index Evaluated for Wildfire Risk Assessment at Stennis Space Center – 29

Assessing Hurricane Katrina Vegetation Damage at Stennis Space Center using IKONOS Image Classification Techniques – 32

Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

REMOTELY PILOTED VEHICLES
The Ground Control Room as an Enabling Technology in the Unmanned Aerial System – 2

RENAL FUNCTION
Baroreflexes and Renal Function – 53

REQUIREMENTS
Implementation of Leak Test Methods for the International Space Station (ISS) Elements, Systems and Components – 11

Summary of LET Requirements/Testing – 80

RESEARCH AIRCRAFT
Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 6

RESEARCH AND DEVELOPMENT
Foton-M2 Russian/US Biology Experiments - Development, Implementation, and Operations – 9

RESEARCH FACILITIES
Cell Culture Tests in the BIOLAB Flight Model – 52

Flame Radiation, Structure, and Scalar Properties in Microgravity Laminar Fires – 25

Foton-M2 Russian/US Biology Experiments - Development, Implementation, and Operations – 9

Sea Urchin Development Test in the BIOLAB Flight Model – 37

RESEARCH MANAGEMENT
Reducing the Risk of Human Missions to Mars Through Testing – 85

RESEARCH
High Pressure Low NOx Emissions Research: Recent Progress at NASA Glenn Research Center – 20

Polymeric Materials for Aerospace Power and Propulsion: Overview of Polymer Research at NASA Glenn – 13

Two-Photon Fluorescence Microscopy for Biomedical Research – 36

RESISTANCE
The Mechanism and Significance of Gravity Resistance in Plants – 74

RHEOLOGY
Microrheology of Mechanosensitive Bone Cells – 70

RIBONUCLEIC ACIDS
Comparative MicroRNA Expression Patterns in Fibroblasts after Low and High Doses of Low-LET Radiation Exposure – 35

Expression Messenger RNA of Two Cytosolic Small Heat Shock Proteins under Clinorotation – 37

Influence of Fluid Shear Stress on Expression of Cbf(alpha)1 in MG-63 Cells Cultured under Simulated Microgravity Condition – 41

RISK
A Rapidly Prototyped Vegetation Dryness Index Evaluated for Wildfire Risk Assessment at Stennis Space Center – 29

Astronaut Risk Levels During Crew Module (CM) Land Landing – 10

Reducing the Risk of Human Missions to Mars Through Testing – 84

ROCKET ENGINES

Environmental Assessment for the Construction and Operation of the Constellation Program A-3 Test Stand – 31

ROLL

Spanwise Wing Loads on the Space Shuttle Orbiter during Roll Maneuver – 25

RUSSIAN SPACE PROGRAM

Foton-M2 Russian/US Biology Experiments - Development, Implementation, and Operations – 9

SALIVA

Determination of Scopolamine in Human Saliva Using Solid Phase Extraction and LC/MS/MS – 44

SANDWICH STRUCTURES

Multi-Functional Sandwich Composites for Spacecraft Applications: An Initial Assessment – 17

SATELLITE DESIGN

STAR Concept for Passive Microwave Temperature Sounding from Middle Earth Orbit (MeoSTAR) – 30

SATELLITE OBSERVATION

Marine Boundary Layer Cloud Properties From AMF Point Reyes Satellite Observations – 33

Time Series Vegetation Aerodynamic Roughness Fields Estimated from MODIS Observations – 28

SEA ICE

Proposing an International Collaboration on Lightweight Autonomous Vehicles to Conduct Scientific Traverses and Surveys over Antarctica and the Surrounding Sea Ice – 84

SEA URCHINS

Sea Urchin Development Test in the BIOLAB Flight Model – 37

SEEDLINGS (BOTANY)

Altered Gravity Effect on the Heat-Shock Protein Level in Plants – 37

Auxin Polar Transport is Essentially Required for Graviresponse in Early Growth Stage of Etiolated Pea Seedlings – 52

Clinorotation Affects the Microtubule Organization in Root Epidermis and Cortex Cells in Brassica Rapa Seedlings – 60

Fluidity of Plasma Membranes of Pea Seedling Roots under Clinorotation – 47

Interrelation Between Cytoskeleton Elements in Root Cells of Arabidopsis-GFP-MAP4 Seedlings under Clinorotation – 60

SELECTION

Relationship of Complexity Factor Ratings with Operational Errors – 2

SELENOLOGY

Development Issues for Lunar Regolith Simulants – 82

In-situ Resource Utilization (ISRU) and Lunar Surface Systems – 83

SENSITIVITY

Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 22

SENSORS

Design of an Auto-zeroed, Differential, Organic Thin-film Field-effect Transistor Amplifier for Sensor Applications – 23

The Effects of Radiation on Imagery Sensors in Space – 85

SENSORY PERCEPTION

Roles of Vestibular and Somatosensory System in Controlling Arterial Pressure during Free Drop-Induced Microgravity – 60

SERUMS

Rat Soleus Muscle Properties and Serum 1GF-1 after Hindlimb Unloading and Reloading – 61

SERVICES

A Correlational Study of How Airline Customer Service and Consumer Perception of Airline Customer Service Affect the Air Rage Phenomenon – 4

SHAPES

Characterization of Nonlinear Rate Dependent Response of Shape Memory Polymers – 19

Non-rigid Medical Image Registration Based on the Thin-plate Spline and Shape Context – 39

SHEAR STRESS

Effect of Simulated Weightlessness on the Expression of CBF 1 Induced by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 64

Effects of Simulated Weightlessness on the Kinase Activity of MEK1 Induced by BMP-2 in Rat Osteosarcoma Cells – 47

Influence of Fluid Shear Stress on Expression of Cbf(alpha)1 in MG-63 Cells Cultured under Simulated Microgravity Condition – 41

SHOULDERS

A Study of Pointing Movement Characteristics and Ergonomics on Front Board – 39

SILICA GLASS

Coated Fused Silica Fibers for Enhanced Sensitivity Torsion Pendulum – 14

SILICON DIOXIDE

Coated Fused Silica Fibers for Enhanced Sensitivity Torsion Pendulum – 14

SIMULATION

Development Issues for Lunar Regolith Simulants – 82

Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program – 82

Whole Body Simulation and Visualization of Metabolic Process of 18F 2-fluoro-2-deoxy-D-glucose – 41

SIMULATORS

Testing Methods of Push-Pull Effect – 64

SINGLE EVENT UPSETS

Summary of LET Requirements/Testing – 80

SINGULARITY (MATHEMATICS)

An Improved Transformation and Optimized Sampling Scheme for the Numerical Evaluation of Singular and Near-Singular Potentials – 78

SKELETAL MUSCLE

Coordinated Switching of Myofilament Protein Isoforms via Gene Regulation and Alternative Splicing during Skeletal Muscle Adaptation – 58

Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

SNAILS

Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 77

SOFTWARE ENGINEERING

A Software Platform for Post-Processing Waveform-Based NDE – 77

JTRS/SCA and Custom/SDR Waveform Comparison – 9

Safe Agents in Space: Lessons from the Autonomous Sciencecraft Experiment – 11

SOFTWARE REUSE

Reuse and Interoperability of Avionics for Space Systems – 7

SOLAR CELLS

The Environmental Performance at Low Intensity, Low Temperature (LILT) of High Efficiency Triple Junction Solar Cells – 23

SOLAR POWERED AIRCRAFT

Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 6

SOLID STATE LASERS

2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

SPACE COMMUNICATION

JTRS/SCA and Custom/SDR Waveform Comparison – 10

SPACE FLIGHT STRESS

A Review of Training Methods and Instructional Techniques: Implications for Behavioral Skills Training in U.S. Astronauts – 74

SPACE FLIGHT

Comparative Analysis of Life Activity of Microoganisms Exposed to Short-Term Spaceflights – 76

Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery – 65

Human Bone-Forming Chondrocytes Cultured in the Hydrodynamic Focusing Bioreactor Retain Matrix Proteins: Similarities to Spaceflight Results – 61

Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

SPACE LABORATORIES

Cell Culture Tests in the BIOLAB Flight Model – 52

Sea Urchin Development Test in the BIOLAB Flight Model – 37

SPACE POWER REACTORS

Liquid-Metal Pump Technologies for Nuclear Surface Power – 13

Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 21

SPACE PSYCHOLOGY

A Review of Training Methods and Instructional Techniques: Implications for Behavioral Skills Training in U.S. Astronauts – 74

SPACE SHUTTLE ORBITERS

Development of Eddy Current Techniques for the Detection of Cracking in Space Shuttle Primary Reaction Control Thrusters – 12

Lessons Learned JSC Micro-Wireless Instrumentation Systems on Space Shuttle and International Space Station CANEUS 2006 – 12

Spanwise Wing Loads on the Space Shuttle Orbiter during Roll Maneuver – 24

SPACE SHUTTLES

Use of Thermoregulatory Models to Enhance Space Shuttle and Space Station operations and Review of Human Thermoregulatory Control – 44

SPACE STATIONS

Research Advancement of Superhydrophilic Thin Film in Condensation Heat Regenerators – 75

SPACE SUITS

Study on Range of Motion of Manual Performance for Ergonomics Evaluation – 40

SPACE TECHNOLOGY EXPERIMENTS

Integration and Testing Challenges of Small Satellite Missions: Experiences from the Space Technology 5 Project – 10

SPACE TRANSPORTATION

Journal of Air Transportation, Volume 11, No. 3 – 3

SPACEBORNE EXPERIMENTS

Cell Culture Tests in the BIOLAB Flight Model – 52

Sea Urchin Development Test in the BIOLAB Flight Model – 37

SPACECRAFT DESIGN

Astronaut Risk Levels During Crew Module (CM) Land Landing – 11

Multi-Functional Sandwich Composites for Spacecraft Applications: An Initial Assessment – 17

SPACECRAFT ELECTRONIC EQUIPMENT

Texas Instruments-Digital Signal Processor(TI-DSP)SMJ320F20 SEL Testing – 85

SPACECRAFT ENVIRONMENTS

Comparative Analysis of Life Activity of Microoganisms Exposed to Short-Term Spaceflights – 76

SPACECRAFT LAUNCHING

TDRSS Augmentation for Launch and Ascent High Speed Navigation Filter – 9

SPACECRAFT MANEUVERS

Spanwise Wing Loads on the Space Shuttle Orbiter during Roll Maneuver – 25

SPACECRAFT POWER SUPPLIES

An Overview and Status of NASA's Radioisotope Power Conversion Technology NRA – 13

SPACECRAFT PROPULSION

Polymeric Materials for Aerospace Power and Propulsion: Overview of Polymer Research at NASA Glenn – 13

SPACECRAFT RADIATORS

Weathering of Thermal Control Coatings – 14

SPACECREWS

In-situ Resource Utilization (ISRU) and Lunar Surface Systems – 83

SPACE-TIME FUNCTIONS

Time-Resolved PIV for Space-Time Correlations in Hot Jets – 24

SPALLATION

Sulfur and Moisture Effects on Alumina Scale and TBC Spallation – 15

SPANWISE BLOWING

Spanwise Wing Loads on the Space Shuttle Orbiter during Roll Maneuver – 25

SPECTROMETERS

The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

SPECTRUM ANALYSIS

Retrievals and Comparisons of Various MODIS-Spectrum Inferred Water Cloud Droplet Effective Radii – 30

Spectral Analysis of Pulse Transit Time Variability – 42

SPERMATOGENESIS

Effects of Modeled Microgravity on Rat Testis – 66

SPINAL CORD

Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery – 65

SPLINES

Non-rigid Medical Image Registration Based on the Thin-plate Spline and Shape Context – 39

SPONTANEOUS COMBUSTION

A Method for Determining Autoignition Temperatures Resulting from Varying Rapid Rise Rates – 28

SPRAYERS

Development of Oxidation Resistant Coatings on GRCop-84 Substrates by Cold Spray Process – 18

STABILITY

Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle – 34

STANDARDS

Test 6, Test 7, and Gas Standard Analysis Results – 17

STARCHES

Long-Term Clinorotation Affects the Amyloplast Structure and Starch Composition in Potato Minitubers – 55

STATIC CHARACTERISTICS

Relationship of Complexity Factor Ratings with Operational Errors – 2

STEELS

Investigation of Low-Cycle Bending Fatigue of AISI 9310 Steel Spur Gears – 27

STEM CELLS

The Effects of Gravity Vector Randomization on Mouse Embryonic Stem Cells in vitro – 51

STIMULATION

Effect of Dry Immersion of Various Durations in Combination with Artificial Stimulation of Foot Support Zones upon Force-Velocity Characteristics of Knee Extensors – 53

STIRLING ENGINES

Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 22

STRESS (BIOLOGY)

A New Wearable System for Cardiorespiratory Monitoring during Gravitational Stress – 49

Role of the Vestibular System in Arterial Pressure Response to Gravitational Stress – 71

STRESS DISTRIBUTION

Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

STRUCTURAL ANALYSIS
Structural Test and Analysis of a Hybrid Inflatable Antenna – 20

STRUCTURAL BASINS
A Behavioral Model of Landscape Change in the Amazon Basin: The Colonist Case – 32

STRUCTURAL ENGINEERING
Lessons Learned JSC Micro-Wireless Instrumentation Systems on Space Shuttle and International Space Station CANEUS 2006 – 12

Structural Test and Analysis of a Hybrid Inflatable Antenna – 20

SUBMERGING
Effect of Dry Immersion of Various Durations in Combination with Artificial Stimulation of Foot Support Zones upon Force-Velocity Characteristics of Knee Extensors – 53

The Eye Pursuit Function during Dry Immersion with and without a Compensator of Support Unloading – 63

SUBSTRATES
Development of Oxidation Resistant Coatings on GRCop-84 Substrates by Cold Spray Process – 18

SULFUR
Sulfur and Moisture Effects on Alumina Scale and TBC Spallation – 15

SUPINE POSITION
Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest – 43

SUPPORTS
Effect of Dry Immersion of Various Durations in Combination with Artificial Stimulation of Foot Support Zones upon Force-Velocity Characteristics of Knee Extensors – 53

SURFACE PLASMON RESONANCE
Oligonucleotide Hybridization Detection Based on Surface Plasmon Resonance Technology – 40

SURFACE ROUGHNESS
Time Series Vegetation Aerodynamic Roughness Fields Estimated from MODIS Observations – 28

SURFACE VEHICLES
Proposing an International Collaboration on Lightweight Autonomous Vehicles to Conduct Scientific Traverses and Surveys over Antarctica and the Surrounding Sea Ice – 84

SURGES
Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 21

SURVEYS
Proposing an International Collaboration on Lightweight Autonomous Vehicles to Conduct Scientific Traverses and Surveys over Antarctica and the Surrounding Sea Ice – 84

SWIRLING
Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

SWITCHING
Design and Implementation of A Portable ECG Monitor for Multi-user – 40

SYMPATHETIC NERVOUS SYSTEM
Baroreflexes and Renal Function – 53

Roles of Vestibular and Somatosensory System in Controlling Arterial Pressure during Free Drop-Induced Microgravity – 59

Sympathetic Beta Antagonist Prevents Bone Mineral Density Decrease Induced by Labyrinthectomy – 48

SYNCHRONOUS SATELLITES
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

SYNTHETIC APERTURES
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

SYNTHETIC ARRAYS
STAR Concept for Passive Microwave Temperature Sounding from Middle Earth Orbit (MeoSTAR) – 30

SYSTEM FAILURES
Flight Test Results from the NF-15B Intelligent Flight Control System (IFCS) Project with Adaptation to a Simulated Stabilator Failure – 3

SYSTEMS ENGINEERING
Electronic Repair Concepts for Long-Duration Spaceflight – 22

Propellant Gauging for Exploration – 82

Reuse and Interoperability of Avionics for Space Systems – 7

SYSTEMS HEALTH MONITORING
Fundamental Technology Development for Gas-Turbine Engine Health Management – 6

SYSTEMS INTEGRATION
High Altitude Long Endurance Remotely Operated Aircraft - National Airspace System Integration - Simulation IPT: Detailed Airspace Operations Simulation Plan. Version 1.0 – 2

Integration and Testing Challenges of Small Satellite Missions: Experiences from the Space Technology 5 Project – 10

TDR SATELLITES
TDRSS Augmentation for Launch and Ascent High Speed Navigation Filter – 9

TECHNOLOGY ASSESSMENT
Guide for Oxygen Compatibility Assessments on Oxygen Components and Systems – 27

Multi-Functional Sandwich Composites for Spacecraft Applications: An Initial Assessment – 17

Reducing the Risk of Human Missions to Mars Through Testing – 84

TECHNOLOGY UTILIZATION
A Technical and Cost Perspective on Radiation Testing Challenges – 21

Cool and Quiet: Partnering to Enhance the Aerodynamic and Acoustic Performance of Installed Electronics Cooling Fans: A White Paper – 79

Earth Observations and the Role of UAVs: A Capabilities Assessment – 29

Entity-centric Abstraction and Modeling Framework for Transportation Architectures – 4

Fundamental Technology Development for Gas-Turbine Engine Health Management – 6

International Space Station Environmental Control and Life Support System Status: 2006 - 2007 – 76

Overview of Potable Water Systems on Spacecraft Vehicles and Applications for the Crew Exploration Vehicle (CEV) – 76

TELEMEDICINE
Diagnostic Imaging in the Medical Support of the Future Missions to the Moon – 43

TEMPERATURE EFFECTS
Effect of an Opaque Reflecting Layer on the Thermal Behavior of a Thermal Barrier Coating – 16

Operational Condition and Superfinishing Effect on High-Speed Helical Gearing System Performance – 28

TEMPERATURE PROFILES
STAR Concept for Passive Microwave Temperature Sounding from Middle Earth Orbit (MeoSTAR) – 30

TENDONS
Effects of Tenotomy and/or Denervation on the Characteristics of Plantaris Muscle Fibers of MDX Mice – 61

TERRAIN
A Behavioral Model of Landscape Change in the Amazon Basin: The Colonist Case – 32

TERRESTRIAL PLANETS
General Astrophysics with TPF: Not Just Dark Energy – 81

TEST FACILITIES
Continued Development of a Global Heat Transfer Measurement System at AEDC Hypervelocity Wind Tunnel 9 – 23

Operational Condition and Superfinishing Effect on High-Speed Helical Gearing System Performance – 28

Operational Results From a High Power Alternator Test Bed – 22

Summary of LET Requirements/Testing – 80

TEST STANDS
Environmental Assessment for the Construction and Operation of the Constellation Program A-3 Test Stand – 31

TESTES
Effects of Modeled Microgravity on Rat Testis – 66

THERMAL ANALYSIS
Improved Thermal Design of a Compression Mold – 16

THERMAL CONTROL COATINGS
Effect of an Opaque Reflecting Layer on the Thermal Behavior of a Thermal Barrier Coating – 16

Weathering of Thermal Control Coatings – 14

THERMAL EMISSION
Gamma-ray Spectral Characteristics of Thermal and Non-thermal Emission from Three Black Holes – 81

THERMAL SHOCK
Altered Gravity Effect on the Heat-Shock Protein Level in Plants – 37

Expression Messenger RNA of Two Cytosolic Small Heat Shock Proteins under Clinorotation – 37

THERMOCHEMISTRY
One-Dimensional Ablation with Pyrolysis Gas Flow Using a Full Newton's Method and Finite Control Volume Procedure – 24

THERMODYNAMICS
Characterization of Nonlinear Rate Dependent Response of Shape Memory Polymers – 19

Operational Condition and Superfinishing Effect on High-Speed Helical Gearing System Performance – 28

THERMOELECTRIC GENERATORS
An Overview and Status of NASA's Radioisotope Power Conversion Technology NRA – 13

THERMOPHOTOVOLTAIC CONVERSION
An Overview and Status of NASA's Radioisotope Power Conversion Technology NRA – 13

THERMOREGULATION
Use of Thermoregulatory Models to Enhance Space Shuttle and Space Station operations and Review of Human Thermoregulatory Control – 44

THIGH
Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume – 59

THIN FILMS
Coated Fused Silica Fibers for Enhanced Sensitivity Torsion Pendulum – 14

Design of an Auto-zeroed, Differential, Organic Thin-film Field-effect Transistor Amplifier for Sensor Applications – 23

Research Advancement of Superhydrophilic Thin Film in Condensation Heat Regenerators – 75

THIN PLATES
Non-rigid Medical Image Registration Based on the Thin-plate Spline and Shape Context – 39

THRUST AUGMENTATION
Experimental Investigation of Unsteady Thrust Augmentation Using a Speaker-Driven Jet – 25

THRUSTORS
Development of Eddy Current Techniques for the Detection of Cracking in Space Shuttle Primary Reaction Control Thrusters – 12

THULIUM
Highly Efficient Q-switched Ho:YLF Laser Pumped by Tm:Fiber Laser – 26

TIME DEPENDENCE
Spectral Analysis of Pulse Transit Time Variability – 42

TIME SERIES ANALYSIS
Time Series Vegetation Aerodynamic Roughness Fields Estimated from MODIS Observations – 28

TISSUES (BIOLOGY)
Daily 1-H Standing Can Prevent Changes in A0 and ATIR Expressions in Arterial Tissues of Simulated Microgravity Rats – 56

TITANIUM
Al, Ti, and Cr: Complex Zoning in Synthetic and Natural Nakhlite Pyroxenes – 84

TOMOGRAPHY
Study on Homogeneous Head Phantoms Based on Electrical Impedance Tomography – 39

TORSION
Coated Fused Silica Fibers for Enhanced Sensitivity Torsion Pendulum – 14

TOXICITY
Test 6, Test 7, and Gas Standard Analysis Results – 17

TRAINING ANALYSIS
A Review of Training Methods and Instructional Techniques: Implications for Behavioral Skills Training in U.S. Astronauts – 74

TRAJECTORIES
A Study of Pointing Movement Characteristics and Ergonomics on Front Board – 39

TDRSS Augmentation for Launch and Ascent High Speed Navigation Filter – 9

TRANSCRIPTION (GENETICS)
Auxin Polar Transport is Essentially Required for Graviresponse in Early Growth Stage of Etiolated Pea Seedlings – 52

Effects of Simulated Weightlessness on the Kinase Activity of MEK1 Induced by BMP-2 in Rat Osteosarcoma Cells – 47

Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

TRANSFORMATIONS (MATHEMATICS)
An Improved Transformation and Optimized Sampling Scheme for the Numerical Evaluation of Singular and Near-Singular Potentials – 78

TRANSMISSIONS (MACHINE ELEMENTS)
Operational Condition and Superfinishing Effect on High-Speed Helical Gearing System Performance – 28

TRAVELING IONOSPHERIC DISTURBANCES
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

TRMM SATELLITE
Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle – 34

TROPICAL REGIONS
Comparison of TWP-ICE Satellite and Field Campaign Aircraft Derived Cloud Properties – 33

TURBINE ENGINES
Implementation of In-Situ Impedance Techniques on a Full Scale Aero-Engine System – 6

TURBOFAN ENGINES
Cool and Quiet: Partnering to Enhance the Aerodynamic and Acoustic Performance of Installed Electronics Cooling Fans: A White Paper – 79

TURBOFANS
Cool and Quiet: Partnering to Enhance the Aerodynamic and Acoustic Performance of Installed Electronics Cooling Fans: A White Paper – 79

TURBOMACHINERY
Design, Fabrication and Performance of Open Source Generation I and II Compliant Hydrodynamic Gas Foil Bearings – 27

ULTRASONICS
A Software Platform for Post-Processing Waveform-Based NDE – 77

Diagnostic Imaging in the Medical Support of the Future Missions to the Moon – 43

Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest – 43

Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume – 59

UNITED STATES
Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

UNIVERSE
The Evolution of the Cluster X-ray Scaling Relations in the Wide Angle ROSAT Pointed Survey Sample at – 81

UNSTEADY FLOW
Experimental Investigation of Unsteady Thrust Augmentation Using a Speaker-Driven Jet – 25

UROLOGY
Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

UTERUS
A Trial for Studying Effects of Gravity on the Fetus – 46

VARIABILITY
Spectral Analysis of Pulse Transit Time Variability – 42

VEGETATION GROWTH
Interrelation Between Cytoskeleton Elements in Root Cells of Arabidopsis-GFP-MAP4 Seedlings under Clinorotation – 60

VEGETATION
Assessing Hurricane Katrina Vegetation Damage at Stennis Space Center using IKONOS Image Classification Techniques – 32

Time Series Vegetation Aerodynamic Roughness Fields Estimated from MODIS Observations – 28

VERTEBRATES
Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 72

Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

VERTICAL LANDING
Astronaut Risk Levels During Crew Module (CM) Land Landing – 11

VESTIBULAR TESTS
Eye Movements of Flatfish for the Changes of Gravity – 49

Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 53

Roles of Vestibular and Somatosensory System in Controlling Arterial Pressure during Free Drop-Induced Microgravity – 59

VESTIBULES
Role of the Vestibular System in Arterial Pressure Response to Gravitational Stress – 71

Sympathetic Beta Antagonist Prevents Bone Mineral Density Decrease Induced by Labyrinthectomy – 48

VESTS
A New Wearable System for Cardiorespiratory Monitoring during Gravitational Stress – 49

VIBRATION TESTS
Performance Characterization and Vibration Testing of 30-cm Carbon-Carbon Ion Optics – 80

VIDEO COMMUNICATION
The Effects of Radiation on Imagery Sensors in Space – 86

VIRAL DISEASES
The Effects of Clinorotation on the Process of Viral Infection in Potato Plants – 51

VISUAL ACUITY
Comparison of Two Alternate Methods for Tracking Toe Clearance – 74

VISUAL PERCEPTION
Whole Body Simulation and Visualization of Metabolic Process of 18F 2-fluoro-2-deoxy-D-glucose – 41

VISUAL TASKS
The Eye Pursuit Function during Dry Immersion with and without a Compensator of Support Unloading – 63

VOLTAGE REGULATORS
Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 21

VOLUME
Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume – 59

WALKING
Comparison of Two Alternate Methods for Tracking Toe Clearance – 74

WATER IMMERSION
Autonomic Adaptation to a Microgravity-Like Environment in Pregnant Women – 59

Baroreflexes and Renal Function – 53

WATER LANDING
Astronaut Risk Levels During Crew Module (CM) Land Landing – 11

WATER VEHICLES
Overview of Potable Water Systems on Spacecraft Vehicles and Applications for the Crew Exploration Vehicle (CEV) – 76

WATER
Retrievals and Comparisons of Various MODIS-Spectrum Inferred Water Cloud Droplet Effective Radii – 30

WAVEFORMS
A Software Platform for Post-Processing Waveform-Based NDE – 77

JTRS/SCA and Custom/SDR Waveform Comparison – 9

WAVELET ANALYSIS
Study of Arterial Blood Pressure Dynamics in Conscious Rats with the Use of Wavelet Analysis – 58

WEATHERING
Weathering of Thermal Control Coatings – 14

WEATHER
An Overview of Climatic Elements – 32

WEIGHTLESSNESS SIMULATION
Autonomic Adaptation to a Microgravity-Like Environment in Pregnant Women – 59

Changes of Mechanotransduction in MG-63 Osteosarcoma Cells Induced by Simulated Weightlessness – 64

Daily 1-H Standing Can Prevent Changes in A0 and ATIR Expressions in Arterial Tissues of Simulated Microgravity Rats – 56

Daily 1-H Standing Can Prevent Changes in Calcium Current of Vascular Myocytes Isolated from Small Mesenteric but not Cerebral Arteries after 3-Day Simulated Microgravity in Rats – 57

Effect of Simulated Weightlessness on the Expression of CBF 1 Induced by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 64

Effects of Simulated Weightlessness on the Kinase Activity of MEK1 Induced by BMP-2 in Rat Osteosarcoma Cells – 47

Effects of Simulated Weightlessness on the Kinase Activity of MEKl Induced by BMP-2 in Rat Osteosarcoma Cells – 70

WEIGHTLESSNESS
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Effects of Intermittent Head-Up Tilt on Endothelin Expression and Morphological Changes of Artery during Simulated Weightlessness in Rabbits – 69

Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

Influence of Space Flight Factors on the Genetic Properties of Streptomyces Lividans 66 (PIJ702) – 67

Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

Phenotypes, Signaling, and Apoptotic Features of Osteoblasts in Microgravity – 54

WIND (METEOROLOGY)
Assessing Hurricane Katrina Vegetation Damage at Stennis Space Center using IKONOS Image Classification Techniques – 32

WIND TUNNEL MODELS
Continued Development of a Global Heat Transfer Measurement System at AEDC Hypervelocity Wind Tunnel 9 – 23

WIND TUNNEL TESTS
Spanwise Wing Loads on the Space Shuttle Orbiter during Roll Maneuver – 25

WING LOADING
Spanwise Wing Loads on the Space Shuttle Orbiter during Roll Maneuver – 25

WIRELESS COMMUNICATION
Lessons Learned JSC Micro-Wireless Instrumentation Systems on Space Shuttle and International Space Station CANEUS 2006 – 12

X RAY ASTRONOMY

The Evolution of the Cluster X-ray Scaling Relations in the Wide Angle ROSAT Pointed Survey Sample at – 81

YLF LASERS

2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

Highly Efficient Q-switched Ho:YLF Laser Pumped by Tm:Fiber Laser – 26

YTTRIUM ALLOYS

Development of Oxidation Resistant Coatings on GRCop-84 Substrates by Cold Spray Process – 18

Personal Author Index

Abe, Chikara
Role of the Vestibular System in Arterial Pressure Response to Gravitational Stress – 71

Roles of Vestibular and Somatosensory System in Controlling Arterial Pressure during Free Drop-Induced Microgravity – 59

Abe, Shiori
A Trial for Studying Effects of Gravity on the Fetus – 46

Adachi, Yasno
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 50

Adams, Daniel O.
Multi-Functional Sandwich Composites for Spacecraft Applications: An Initial Assessment – 17

Adegoke, Jimmy O.
A New Paradigm for Assessing the Role of Agriculture in the Climate System and in Climate Change – 34

Al, Wei-dang
Development of an Improved Ground-based Prototype of Space Plant-growing Facility – 40

Akima, Hiroshi
Unilateral Lower Limb Suspension Induced Atrophy as a Model of Unweighting – 66

Aleinikova, Karina
Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

Alekhina, M. I.
The Eye Pursuit Function during Dry Immersion with and without a Compensator of Support Unloading – 63

Allen, Michael J.
Guidance and Control of an Autonomous Soaring UAV – 8

Twist Model Development and Results from the Active Aeroelastic Wing F/A-18 Aircraft – 7

Almeida, E. A. C.
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

Almeida, E. A.
Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Almeida, E.
Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

Almeida, Eduardo
Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

Altaeva, E. G.
Resting Intracellular Calcium Level as a Triggering Signal for Soleus Fiber Alterations during Unloading – 66

Amar, Adam J.
One-Dimensional Ablation with Pyrolysis Gas Flow Using a Full Newton's Method and Finite Control Volume Procedure – 24

Ambesi-Impiombato, Saverio
Cell Culture Tests in the BIOLAB Flight Model – 51

Anderson, David J.
An Overview and Status of NASA's Radioisotope Power Conversion Technology NRA – 12

Anderson, Lynn M.
Fundamental Technology Development for Gas-Turbine Engine Health Management – 6

Arbeille, P.
Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume – 59

Arbeille, Ph.
Effect of Abdominal or Lower Limb Muscle, Isometric Contraction during Stand Test, on the Portal Venous and Femoral and Cerebral Arterial Hemodynamics – 68

WISE-2005: Adrenergic Responses Before and After 60 Days of 6 Degree Head-Down Bed-Rest in Women – 55

WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

Arbeille, Philippe
Non-Invasive Tonometric versus invasive Radial Artery Blood Pressure during Altered Gravity Conditions – 49

Arima, E.
A Behavioral Model of Landscape Change in the Amazon Basin: The Colonist Case – 31

Arnold, Steven M.
Fundamental Technology Development for Gas-Turbine Engine Health Management – 6

Asadchikov, V. E.
Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

Aseev, N. A.
Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

Asipauskas, Marius
Two-Photon Fluorescence Microscopy for Biomedical Research – 36

Aubert, Andre E.
Heart Rate Reflexes and Arterial Pressure Control after Short-Duration Spaceflight – 70

Awazu, Chihiro
Role of the Vestibular System in Arterial Pressure Response to Gravitational Stress – 71

Roles of Vestibular and Somatosensory System in Controlling Arterial Pressure during Free Drop-Induced Microgravity – 59

Ayers, J. K.
Comparison of TWP-ICE Satellite and Field Campaign Aircraft Derived Cloud Properties – 33

Ayers, Jeffrey K.
A Comparison of Satellite-Based Multilayered Cloud Detection Methods – 33

BA, Jie
Design and Implement of the ECLSS Adaptive Learning Intelligent Decision Support System – 75

Bacabac, R. G.
Microrheology of Mechanosensitive Bone Cells – 69

Bai, Jing
A Scoring Method for Quantitative Assessment of Cardiovascular Health Status Based on Non-linear Parameters – 42

BAI, Jing
Design and Implementation of A Portable ECG Monitor for Multi-user – 40

Preliminary Research on Effects of Percutaneous Muscular Electrical Stimulation against Bone Loss in Tail-suspended Rats – 41

BAI Jing
Whole Body Simulation and Visualization of Metabolic Process of 18F 2-fluoro-2-deoxy-D-glucose – 41

BAI, Yan-qiang
Oligonucleotide Hybridization Detection Based on Surface Plasmon Resonance Technology – 40

Bai, Yingxin
2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

Highly Efficient Q-switched Ho:YLF Laser Pumped by Tm:Fiber Laser – 26

Bai,Yan
Spectral Analysis of Pulse Transit Time Variability – 42

Balaban, P. M.
Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

Baranenko, Valentina
Fluidity of Plasma Membranes of Pea Seedling Roots under Clinorotation – 47

Baranenko, Valentyna V.
The State of the Antioxidative System in Pea Plants under Clinorotation – 36

Beckers, Frank
Heart Rate Reflexes and Arterial Pressure Control after Short-Duration Spaceflight – 70

Behar, Alberto
Proposing an International Collaboration on Lightweight Autonomous Vehicles to Conduct Scientific Traverses and Surveys over Antarctica and the Surrounding Sea Ice – 84

Behun, Vaughn
Structural Test and Analysis of a Hybrid Inflatable Antenna – 20

Bell, V.
Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume – 59

Bennett, Thomas W.
Design, Development and Flight Testing of the U.S. Army 4200 sq ft Parafoil Recovery System – 78

Bennett, William
An Update on the Lithium-Ion Cell Low-Earth-Orbit Verification Test Program – 18

Berthelot, M.
Cerebral Oxygenation Control is Maintained under Push-pull Effect at Low Gz Level Exposure – 50

Besnard, S.
Effect of Abdominal or Lower Limb Muscle, Isometric Contraction during Stand Test, on the Portal Venous and Femoral and Cerebral Arterial Hemodynamics – 68

Bezruk, Leonid
Fluidity of Plasma Membranes of Pea Seedling Roots under Clinorotation – 47

Biernacki, M.
Push-Pull Centrifuge Training for the Polish Pilots: Two Years' Experience – 45

Binkley, David M.
Design of an Auto-zeroed, Differential, Organic Thin-film Field-effect Transistor Amplifier for Sensor Applications – 23

Birchenough, Arthur
Operational Results From a High Power Alternator Test Bed – 22

Blackwell, Ben F.
One-Dimensional Ablation with Pyrolysis Gas Flow Using a Full Newton's Method and Finite Control Volume Procedure – 24

Bloom, Dave
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

Bloomberg, Jacob J.
Comparison of Two Alternate Methods for Tracking Toe Clearance – 74

Blottner, Dieter
Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

Booth, Matthew
Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

Borak, Jordan S.
Time Series Vegetation Aerodynamic Roughness Fields Estimated from MODIS Observations – 28

Borovik, A. S.
Study of Arterial Blood Pressure Dynamics in Conscious Rats with the Use of Wavelet Analysis – 58

Bosworth, John T.
Flight Test Results from the NF-15B Intelligent Flight Control System (IFCS) Project with Adaptation to a Simulated Stabilator Failure – 2

Bowen, Brent
Journal of Air Transportation, Volume 11, No. 3 – 3

Bowman, Cheryl L.
Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 21

Boyd, Jason
Determination of Scopolamine in Human Saliva Using Solid Phase Extraction and LC/MS/MS – 44

Boyle, R.
Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

Brandon, Erik
Design of an Auto-zeroed, Differential, Organic Thin-film Field-effect Transistor Amplifier for Sensor Applications – 23

Bravarenko, N. I.
Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

Brazhe, N. A.
Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

Brinckmann, Enno
Cell Culture Tests in the BIOLAB Flight Model – 51

Sea Urchin Development Test in the BIOLAB Flight Model – 37

Brooks, T. F.
Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

Brooks, Thomas
Characterization of Kevlar Using Raman Spectroscopy – 17

Brophy, John R.
Performance Characterization and Vibration Testing of 30-cm Carbon-Carbon Ion Optics – 80

Brown, John M.
Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 5

Bruckner, Robert J.
Design, Fabrication and Performance of Open Source Generation I and II Compliant Hydrodynamic Gas Foil Bearings – 27

Bryzgalova, N. Yu.
Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

Buchanan, Ernie
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

Buchner, Stephen
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

Buravkova, L. B.
The Effects of Gravity Vector Randomization on Mouse Embryonic Stem Cells in vitro – 51

Burke, Christopher S.
Investigation of Low-Cycle Bending Fatigue of AISI 9310 Steel Spur Gears – 27

Butorina, M. N.
Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

Buzmakov, A. V.
Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

Caiani, E. G.
Evaluation of Changes in Left Ventricular Early Diastolic Mitral Annular Velocity during Parabolic Flight Using Tissue Doppler Echocardiography – 62

Caldas, M.
A Behavioral Model of Landscape Change in the Amazon Basin: The Colonist Case – 31

Callahan, Michael R.
Overview of Potable Water Systems on Spacecraft Vehicles and Applications for the Crew Exploration Vehicle (CEV) – 76

Camp, Jordan
Coated Fused Silica Fibers for Enhanced Sensitivity Torsion Pendulum – 14

Capderou, A.
Evaluation of Changes in Left Ventricular Early Diastolic Mitral Annular Velocity during Parabolic Flight Using Tissue Doppler Echocardiography – 62

Capri, A.
Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume – 59

Carney, Kelly S.
Astronaut Risk Levels During Crew Module (CM) Land Landing – 10

Carpenter, Paul
Development Issues for Lunar Regolith Simulants – 82

Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program – 82

Carsey, Frank
Proposing an International Collaboration on Lightweight Autonomous Vehicles to Conduct Scientific Traverses and Surveys over Antarctica and the Surrounding Sea Ice – 84

Castano, Rebecca
Safe Agents in Space: Lessons from the Autonomous Sciencecraft Experiment – 11

Castiglioni, Paolo
A New Wearable System for Cardiorespiratory Monitoring during Gravitational Stress – 48

Autonomic Adaptation to a Microgravity-Like Environment in Pregnant Women – 59

Cettl, L.
Testing Methods of Push-Pull Effect – 64

Chang, Fu-Lung
A Comparison of Satellite-Based Multilayered Cloud Detection Methods – 33

Changlie, Wey
Gas Emissions Acquired during the Aircraft Particle Emission Experiment (APEX) Series – 31

Chase, Thomas N.
A New Paradigm for Assessing the Role of Agriculture in the Climate System and in Climate Change – 34

CHEN, Shou-ping
Study on Range of Motion of Manual Performance for Ergonomics Evaluation – 39

CHEN, Xiao
Research Advancement of Superhydrophilic Thin Film in Condensation Heat Regenerators – 75

Chen, Yi-Chao
Characterization of Nonlinear Rate Dependent Response of Shape Memory Polymers – 19

CHEN Ying-mao
Whole Body Simulation and Visualization of Metabolic Process of 18F 2-fluoro-2-deoxy-D-glucose – 41

Chien, Steve
Safe Agents in Space: Lessons from the Autonomous Sciencecraft Experiment – 11

Chi-Ming, Lee
High Pressure Low NOx Emissions Research: Recent Progress at NASA Glenn Research Center – 19

Chin, Mian
Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle – 33

Chowen, Chou Wey
Gas Emissions Acquired during the Aircraft Particle Emission Experiment (APEX) Series – 31

Chu, D. Allen
Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

Cichy, Benjamin
Safe Agents in Space: Lessons from the Autonomous Sciencecraft Experiment – 11

Clark, J. B.
Use of Thermoregulatory Models to Enhance Space Shuttle and Space Station operations and Review of Human Thermoregulatory Control – 44

Cogoli, Augusto
Journal of Gravitational Physiology, Volume 13, No. 1 – 45

Cohen, B.
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

Cohen, Lewis M.
A Technical and Cost Perspective on Radiation Testing Challenges – 21

Corvisier, J.
Sympathetic Beta Antagonist Prevents Bone Mineral Density Decrease Induced by Labyrinthectomy – 48

Couckuyt, Kurt
Heart Rate Reflexes and Arterial Pressure Control after Short-Duration Spaceflight – 70

Cox, Timothy H.
Earth Observations and the Role of UAVs: A Capabilities Assessment – 29

Crago, Richard D.
Time Series Vegetation Aerodynamic Roughness Fields Estimated from MODIS Observations – 28

Crawford, Robert L.
Design of an Auto-zeroed, Differential, Organic Thin-film Field-effect Transistor Amplifier for Sensor Applications – 23

Crutcher, H. L.
An Overview of Climatic Elements – 32

Cucinota, F. A.
Chromosome Aberrations in Normal and Ataxia-Telangiectasia Cells Exposed to Heavy Ions – 35

Cucinotta, F. A.
Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis – 44

Cucinotta, Francis
Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

Custaud, M. A.
WISE-2005: Adrenergic Responses Before and After 60 Days of 6 Degree Head-Down Bed-Rest in Women – 55

DAI, Zhong-quan
Oligonucleotide Hybridization Detection Based on Surface Plasmon Resonance Technology – 40

daSilva, B.
Gravitational Conception of Essential Hypertension – 52

Davies, Ashley
Safe Agents in Space: Lessons from the Autonomous Sciencecraft Experiment – 11

Davis, Gregory
The Environmental Performance at Low Intensity, Low Temperature (LILT) of High Efficiency Triple Junction Solar Cells – 22

DeLaurentis, Daniel A.
Entity-centric Abstraction and Modeling Framework for Transportation Architectures – 4

DellaCorte, Christopher
Design, Fabrication and Performance of Open Source Generation I and II Compliant Hydrodynamic Gas Foil Bearings – 27

DENG, Yi-bing
Design and Implement of the ECLSS Adaptive Learning Intelligent Decision Support System – 75

Denise, P.
Sympathetic Beta Antagonist Prevents Bone Mineral Density Decrease Induced by Labyrinthectomy – 48

Denise, Pierre
Non-Invasive Tonometric versus invasive Radial Artery Blood Pressure during Altered Gravity Conditions – 49

Dennis, Donn M.
Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

Derendorf, Hartmut
Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

DeWitt, John
The Effect of Increasing Mass upon Locomotion – 43

Dinardo, S. J.
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

DING, Li
Study on Range of Motion of Manual Performance for Ergonomics Evaluation – 39

DiRienzo, Marco
A New Wearable System for Cardiorespiratory Monitoring during Gravitational Stress – 48

Distefano, Salvador
The Environmental Performance at Low Intensity, Low Temperature (LILT) of High Efficiency Triple Junction Solar Cells – 22

Doggett, Glen P.
Spanwise Wing Loads on the Space Shuttle Orbiter during Roll Maneuver – 24

Doiron, Terence A.
STAR Concept for Passive Microwave Temperature Sounding from Middle Earth Orbit (MeoSTAR) – 30

Domaratskaya, E. I.
Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

Domaratskaya, E.
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Domaratskaya, Elena
Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

DONG, Xiu-zhen
Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment – 42

Study on Homogeneous Head Phantoms Based on Electrical Impedance Tomography – 39

Dorogovtsev, V.
Gravitational Conception of Essential Hypertension – 52

Dosel, P.
Testing Methods of Push-Pull Effect – 64

Drake, Bret G.
Reducing the Risk of Human Missions to Mars Through Testing – 84

Drzyzga, S. A.
A Behavioral Model of Landscape Change in the Amazon Basin: The Colonist Case – 31

Du, Juan
Spectral Analysis of Pulse Transit Time Variability – 42

Du, Jun-min
A Study of Pointing Movement Characteristics and Ergonomics on Front Board – 38

Dubovy, Valeriy
Fluidity of Plasma Membranes of Pea Seedling Roots under Clinorotation – 47

Duke, P. J.
Human Bone-Forming Chondrocytes Cultured in the Hydrodynamic Focusing Bioreactor Retain Matrix Proteins: Similarities to Spaceflight Results – 61

Dulchavsky, Scott A.
Diagnostic Imaging in the Medical Support of the Future Missions to the Moon – 43

Duncan, J. Michael
Diagnostic Imaging in the Medical Support of the Future Missions to the Moon – 43

Duretete, Arnaud
Non-Invasive Tonometric versus invasive Radial Artery Blood Pressure during Altered Gravity Conditions – 49

Dyson, K.
WISE-2005: Adrenergic Responses Before and After 60 Days of 6 Degree Head-Down Bed-Rest in Women – 55

Easton, John
Electronic Repair Concepts for Long-Duration Spaceflight – 22

Repair of Electronics for Long Duration Spaceflight – 7

Ebeling, H.
The Evolution of the Cluster X-ray Scaling Relations in the Wide Angle ROSAT Pointed Survey Sample at – 81

Eche, Brigitte
Cell Culture Tests in the BIOLAB Flight Model – 51

Sea Urchin Development Test in the BIOLAB Flight Model – 37

Edgell, H.
WISE-2005: Adrenergic Responses Before and After 60 Days of 6 Degree Head-Down Bed-Rest in Women – 55

WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

Edwards, Jack R.
One-Dimensional Ablation with Pyrolysis Gas Flow Using a Full Newton's Method and Finite Control Volume Procedure – 24

Ehinger, R.
Operational Condition and Superfinishing Effect on High-Speed Helical Gearing System Performance – 28

Etard, O.
Sympathetic Beta Antagonist Prevents Bone Mineral Density Decrease Induced by Labyrinthectomy – 48

Etienne, X.
Cerebral Oxygenation Control is Maintained under Push-pull Effect at Low Gz Level Exposure – 50

Evans, H.
Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest – 43

Faini, Andrea
A New Wearable System for Cardiorespiratory Monitoring during Gravitational Stress – 48

Feikema, Douglas
Flame Radiation, Structure, and Scalar Properties in Microgravity Laminar Fires – 25

Feiveson, Alan H.
Comparison of Two Alternate Methods for Tracking Toe Clearance – 74

Felsenberg. Doeter
Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

Feng, Han-Zhong
Coordinated Switching of Myofilament Protein Isoforms via Gene Regulation and Alternative Splicing during Skeletal Muscle Adaptation – 58

Ferratini, Maurizio
A New Wearable System for Cardiorespiratory Monitoring during Gravitational Stress – 48

Fink, Mary
Journal of Air Transportation, Volume 11, No. 3 – 3

Fink, Patrick W.
An Improved Transformation and Optimized Sampling Scheme for the Numerical Evaluation of Singular and Near-Singular Potentials – 78

Fischer, David
Two-Photon Fluorescence Microscopy for Biomedical Research – 36

Fleischer, Iris
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

Forney, Jim
Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 20

Fox, Roy, Jr.
Design, Development and Flight Testing of the U.S. Army 4200 sq ft Parafoil Recovery System – 78

French, Raymond
Development Issues for Lunar Regolith Simulants – 82

Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program – 82

FU, Feng
Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment – 42

Fujishima, Thoru
Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

Fukunaga, Tetsuo
Unilateral Lower Limb Suspension Induced Atrophy as a Model of Unweighting – 66

Fukuoka, Hideoki
Does a 16-Day Bed-Rest Cause a Deterioration of Executive Function? – 47

Fukushima, Genzo
Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

Fuller, Charles A.
Journal of Gravitational Physiology, Volume 13, No. 1 – 45

Fu-Lung, Chang
Retrievals and Comparisons of Various MODIS-Spectrum Inferred Water Cloud Droplet Effective Radii – 29

Gaeta, R. J.
Implementation of In-Situ Impedance Techniques on a Full Scale Aero-Engine System – 6

Gaier, Matthew
Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 5

Galarza, Laura
A Review of Training Methods and Instructional Techniques: Implications for Behavioral Skills Training in U.S. Astronauts – 74

Ganga, Hanns-Christian
Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

Gao, Fang
Coordinated Switching of Myofilament Protein Isoforms via Gene Regulation and Alternative Splicing during Skeletal Muscle Adaptation – 58

Daily 1-H Standing Can Prevent Changes in A0 and ATIR Expressions in Arterial Tissues of Simulated Microgravity Rats – 56

GAO, Wen-bin
Early Face Processing of Internet Addiction Patients by Face-specific N170 – 39

Garab, Sandor
3D Reconstruction in the Cerebellar Cortex as an Effective Tool to Investigate Neuronal Plasticity – 62

Gaspar, James L.
Structural Test and Analysis of a Hybrid Inflatable Antenna – 20

Gasset, Gilbert
Cell Culture Tests in the BIOLAB Flight Model – 51

Sea Urchin Development Test in the BIOLAB Flight Model – 37

Gear, Gary
The Ground Control Room as an Enabling Technology in the Unmanned Aerial System – 2

Gee, George B.
Texas Instruments-Digital Signal Processor(TI-DSP)SMJ320F20 SEL Testing – 85

Gellert, R.
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

Geng, Steven M.
Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 21

Gentry, Gregory J.
International Space Station Environmental Control and Life Support System Status: 2006 - 2007 – 76

George, K.
Chromosome Aberrations in Normal and Ataxia-Telangiectasia Cells Exposed to Heavy Ions – 35

Gersey, B.
Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis – 44

Globus, R. K.
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Goins, T. L.
Influence of Space Flight Factors on the Genetic Properties of Streptomyces Lividans 66 (PIJ702) – 67

Goldman, Scott M.
Relationship of Complexity Factor Ratings with Operational Errors – 2

Gonzalez-Camacho, Fernando
Simulated Microgravity Affects the Plant Nucleolar Protein NopA100 – 50

Gordeychik, O. I.
The Effects of Clinorotation on the Process of Viral Infection in Potato Plants – 51

Gorjidooz, Javad
Productivity Analysis of Public and Private Airports: A Causal Investigation – 3

Gostomski, Tom
Integration and Testing Challenges of Small Satellite Missions: Experiences from the Space Technology 5 Project – 10

Goto, Katsumasa
Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

Gotoh, Taro M.
Role of the Vestibular System in Arterial Pressure Response to Gravitational Stress – 71

Graham, William D.
Assessing Hurricane Katrina Vegetation Damage at Stennis Space Center using IKONOS Image Classification Techniques – 32

Graham, William
A Rapidly Prototyped Vegetation Dryness Index Evaluated for Wildfire Risk Assessment at Stennis Space Center – 28

Greaves, D.
WISE-2005: Adrenergic Responses Before and After 60 Days of 6 Degree Head-Down Bed-Rest in Women – 55

Grigorian, E. N.
Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

Grigoryan, Elonora
Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

Grigoryan, N.
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Grivennikov, I. A.
The Effects of Gravity Vector Randomization on Mouse Embryonic Stem Cells in vitro – 51

Gross, S. M.
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

Gulimova, V. I.
Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

Gulimova, V.
Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

GUO, Shuang-sheng
Development of an Improved Ground-based Prototype of Space Plant-growing Facility – 40

Gurfinkel, Yury I.
Effect of the Lower Body Negative Pressure (LBNP) Test on the Mirocirculation of Healthy Volunteers and Patients with Coronary Artery Disease – 66

Hada, M.
Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis – 44

Hada, Megumi
Comparative MicroRNA Expression Patterns in Fibroblasts after Low and High Doses of Low-LET Radiation Exposure – 34

Hagan, Donald
The Effect of Increasing Mass upon Locomotion – 43

Hagopian, Michael
A Method for Determining Autoignition Temperatures Resulting from Varying Rapid Rise Rates – 27

Haimes, Robert
CAPRI: A Geometric Foundation for Computational Analysis and Design – 77

Hait, Tom
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

Hama, Masako
A Trial for Studying Effects of Gravity on the Fetus – 46

Hamilton, Douglas R.
Diagnostic Imaging in the Medical Support of the Future Missions to the Moon – 43

Hammond, Diane
Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

Hamner, M. P.
Continued Development of a Global Heat Transfer Measurement System at AEDC Hypervelocity Wind Tunnel 9 – 23

Handschuh, R.
Operational Condition and Superfinishing Effect on High-Speed Helical Gearing System Performance – 28

Handschuh, Robert F.
Investigation of Low-Cycle Bending Fatigue of AISI 9310 Steel Spur Gears – 27

Hanousek, J.
Testing Methods of Push-Pull Effect – 64

Hansen, Frederick D.
Human Error: A Concept Analysis – 4

Hargens, A. R.
WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

Hargens, Alan R.
Journal of Gravitational Physiology, Volume 13, No. 1 – 45

Hazama, Akihiro
A Trial for Studying Effects of Gravity on the Fetus – 46

Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

Hecht, J.
Human Bone-Forming Chondrocytes Cultured in the Hydrodynamic Focusing Bioreactor Retain Matrix Proteins: Similarities to Spaceflight Results – 61

Henwood, Bart
Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 5

Hervol, David
Operational Results From a High Power Alternator Test Bed – 22

Higashibata, Akira
Change of Bone Mineral and Morphology in Growing Rat Leg Bone after Hindlimb Unloading – 65

Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery – 65

Higo, Yako
Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

Higo, Yoko
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 50

Effects of Tenotomy and/or Denervation on the Characteristics of Plantaris Muscle Fibers of MDX Mice – 61

Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Hitomi, Yoshiaki
Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

Hodson, Robert F.
Reuse and Interoperability of Avionics for Space Systems – 7

Hoffman, Stephen J.
NASA/ESMD Analogue Mission Plans – 83

Holland, Albert W.
A Review of Training Methods and Instructional Techniques: Implications for Behavioral Skills Training in U.S. Astronauts – 74

Holquin, N.
Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest – 43

Holt, Greg .
TDRSS Augmentation for Launch and Ascent High Speed Navigation Filter – 9

Horii, Arata
Impaired Spatial Learning after Hypergravity Load in Rats – 62

Microarray Analysis of Hippocampal Gene Expression in Rats Exposed to Hypergravity – 75

Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 53

Horowitz, Jordan
Coated Fused Silica Fibers for Enhanced Sensitivity Torsion Pendulum – 14

Hoshino, Temeki
Auxin Polar Transport is Essentially Required for Graviresponse in Early Growth Stage of Etiolated Pea Seedlings – 52

Hoson, Takayuki
Effects of Hypergravity Stimulus on Primary Xylem Development and Mechanical Properties of Secondary Cell Walls in Inflorescence Stems of Arabidopsis Thaliana L. – 36

The Mechanism and Significance of Gravity Resistance in Plants – 73

Hotta, Norio
Unilateral Lower Limb Suspension Induced Atrophy as a Model of Unweighting – 66

HOU, Wenhua
Research Advancement of Superhydrophilic Thin Film in Condensation Heat Regenerators – 75

Howard, S. Adam
Design, Fabrication and Performance of Open Source Generation I and II Compliant Hydrodynamic Gas Foil Bearings – 27

HU, Wei
Design and Implement of the ECLSS Adaptive Learning Intelligent Decision Support System – 75

Hughson, R. L.
WISE-2005: Adrenergic Responses Before and After 60 Days of 6 Degree Head-Down Bed-Rest in Women – 55

WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

Humphreys, W. M. Jr.
Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

Hunter, Abigail
Multi-Functional Sandwich Composites for Spacecraft Applications: An Initial Assessment – 17

Hunter, Gary W.
Fundamental Technology Development for Gas-Turbine Engine Health Management – 6

Hunter, Joyce A.
A Correlational Study of How Airline Customer Service and Consumer Perception of Airline Customer Service Affect the Air Rage Phenomenon – 4

HUO, Xu-yang
Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment – 42

Hysong, Sylvia J.
A Review of Training Methods and Instructional Techniques: Implications for Behavioral Skills Training in U.S. Astronauts – 74

Ierusalimsky, V. N.
Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

Ikeda, Tohru
Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

Ilyin, E. A.
Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

Ilyin, Eugene A.
Foton-M2 Russian/US Biology Experiments - Development, Implementation, and Operations – 9

Inada, Hiroyuki
Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

Ishida, Koji
Unilateral Lower Limb Suspension Induced Atrophy as a Model of Unweighting – 66

Ishihara, Akihiko
Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery – 65

Ishioka, Noriaki
Change of Bone Mineral and Morphology in Growing Rat Leg Bone after Hindlimb Unloading – 65

Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery – 65

Ishizaki, Yuko
Does a 16-Day Bed-Rest Cause a Deterioration of Executive Function? – 47

Ishmael, Stephen D.
Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 5

Ito, H.
Chromosome Aberrations in Normal and Ataxia-Telangiectasia Cells Exposed to Heavy Ions – 35

Ito, Tsunekata
Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

Ivanenko, G. F.
Histochemical Research of Brassica Rapa Embryos at the Different Stages of Development under Clinorotation – 61

Ivanova, S. M.
Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

Iwaniec, U. T.
Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Iwase, Satoshi
Unilateral Lower Limb Suspension Induced Atrophy as a Model of Unweighting – 66

Iwashita, Yoichiro
Change of Bone Mineral and Morphology in Growing Rat Leg Bone after Hindlimb Unloading – 65

Iwata, Kaori
Eye Movements of Flatfish for the Changes of Gravity – 49

Izawa, Tetsuya
Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

Jackson, Thomas N.
Design of an Auto-zeroed, Differential, Organic Thin-film Field-effect Transistor Amplifier for Sensor Applications – 23

Janelle, Gregory M.
Anesthesia during and Immediately after Spaceflight – 71

Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

Jansen, J. A.
On Gravity and Grooves – 55

Jasinski, Michael F.
Time Series Vegetation Aerodynamic Roughness Fields Estimated from MODIS Observations – 28

Jaworske, Donald A.
Weathering of Thermal Control Coatings – 14

Jeevarajan, Antony
Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

Jensen, Michael
Marine Boundary Layer Cloud Properties From AMF Point Reyes Satellite Observations – 32

Jin, Jian-Ping
Coordinated Switching of Myofilament Protein Isoforms via Gene Regulation and Alternative Splicing during Skeletal Muscle Adaptation – 58

John, Wentworth T.
Experimental Investigation of Unsteady Thrust Augmentation Using a Speaker-Driven Jet – 25

Johnson, D. L.
An Overview of Climatic Elements – 32

Johnston, J. Christopher
Improved Thermal Design of a Compression Mold – 16

Jones, Jeffrey A.
Diagnostic Imaging in the Medical Support of the Future Missions to the Moon – 43

Jones, L. R.
The Evolution of the Cluster X-ray Scaling Relations in the Wide Angle ROSAT Pointed Survey Sample at – 81

Jones, M. G.
Implementation of In-Situ Impedance Techniques on a Full Scale Aero-Engine System – 6

Jouanin, J-C
Cerebral Oxygenation Control is Maintained under Push-pull Effect at Low Gz Level Exposure – 50

Judex, S.
Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest – 43

Kabashkin, Igor
Journal of Air Transportation, Volume 11, No. 3 – 3

Kalinina, Iana
Clinorotation Affects the Microtubule Organization in Root Epidermis and Cortex Cells in Brassica Rapa Seedlings – 60

Kalinina, Ya.
Interrelation Between Cytoskeleton Elements in Root Cells of Arabidopsis-GFP-MAP4 Seedlings under Clinorotation – 60

Kamijo, Kaori
A Trial for Studying Effects of Gravity on the Fetus – 46

Kamisaka, Seiichiro
Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana – 63

Effects of Hypergravity Stimulus on Primary Xylem Development and Mechanical Properties of Secondary Cell Walls in Inflorescence Stems of Arabidopsis Thaliana L. – 36

Kaneko, Kazunari
Does a 16-Day Bed-Rest Cause a Deterioration of Executive Function? – 47

Kangaslahti, P. P.
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

Karahara, Ichirou
Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana – 63

Effects of Hypergravity Stimulus on Primary Xylem Development and Mechanical Properties of Secondary Cell Walls in Inflorescence Stems of Arabidopsis Thaliana L. – 36

Karsh, Jeremy
Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 20

Karthikeyan, J.
Development of Oxidation Resistant Coatings on GRCop-84 Substrates by Cold Spray Process – 18

Katahira, Kiyoaki
Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

Katayama, Keisho
Unilateral Lower Limb Suspension Induced Atrophy as a Model of Unweighting – 66

Katayama, Naomi
Living in Greenhouse Built on Mars – 46

Katsuda, Shin-ichiro
Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

Katz, Richard
Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 20

Kauder, Lonny R.
Weathering of Thermal Control Coatings – 14

Kaufman, Yoram J.
Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle – 33

Kawabe, Naoko
Effects of Tenotomy and/or Denervation on the Characteristics of Plantaris Muscle Fibers of MDX Mice – 61

Kawano, Fumijnori
Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

Kawano, Fuminori
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 50

Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery – 65

Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

Effects of Tenotomy and/or Denervation on the Characteristics of Plantaris Muscle Fibers of MDX Mice – 61

Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

Kawata, T.
Chromosome Aberrations in Normal and Ataxia-Telangiectasia Cells Exposed to Heavy Ions – 35

Kennedy, Carolyn D.
Environmental Assessment for the Construction and Operation of the Constellation Program A-3 Test Stand – 31

Kerbeci, P.
Effect of Abdominal or Lower Limb Muscle, Isometric Contraction during Stand Test, on the Portal Venous and Femoral and Cerebral Arterial Hemodynamics – 68

Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume – 59

WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

Kero, Frank A.
Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

Khaiyer, Mandana M.
A Comparison of Satellite-Based Multilayered Cloud Detection Methods – 33

Comparison of TWP-ICE Satellite and Field Campaign Aircraft Derived Cloud Properties – 33

Retrievals and Comparisons of Various MODIS-Spectrum Inferred Water Cloud Droplet Effective Radii – 29

Khaiyer, Mandana
Marine Boundary Layer Cloud Properties From AMF Point Reyes Satellite Observations – 32

Khayat, Michael A.
An Improved Transformation and Optimized Sampling Scheme for the Numerical Evaluation of Singular and Near-Singular Potentials – 78

Khrushchov, N. G.
Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

Khusnutdinova, D. R.
Effect of Dry Immersion of Various Durations in Combination with Artificial Stimulation of Foot Support Zones upon Force-Velocity Characteristics of Knee Extensors – 53

Kilmain, C.
Operational Condition and Superfinishing Effect on High-Speed Helical Gearing System Performance – 28

Kim, H. S.
Texas Instruments-Digital Signal Processor(TI-DSP)SMJ320F20 SEL Testing – 85

Kim, Hak
Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 20

Kimoto, Mari
Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

Kitahara, Tadashi
Impaired Spatial Learning after Hypergravity Load in Rats – 62

Microarray Analysis of Hippocampal Gene Expression in Rats Exposed to Hypergravity – 75

Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 53

Kitama, Toshihiro
Change in Spatial Orientation of Optokinetic Nystagmus and Optokinetic After-Nystagmus in Cats under Side-Down Tilt Conditions – 50

Klein-Nulend, J.
Microrheology of Mechanosensitive Bone Cells – 69

Kleyner, Igor
Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 20

Klingelhoefer, Goestar
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

Klymchuk, Dmytro
Fluidity of Plasma Membranes of Pea Seedling Roots under Clinorotation – 47

Koch, L. Danielle
Cool and Quiet: Partnering to Enhance the Aerodynamic and Acoustic Performance of Installed Electronics Cooling Fans: A White Paper – 79

Konig, Marton
3D Reconstruction in the Cerebellar Cortex as an Effective Tool to Investigate Neuronal Plasticity – 62

Konstantinova, N. A.
The Effects of Gravity Vector Randomization on Mouse Embryonic Stem Cells in vitro – 51

Kordyum, E. L.
Altered Gravity Effect on the Heat-Shock Protein Level in Plants – 37

Kordyum, E.
Interrelation Between Cytoskeleton Elements in Root Cells of Arabidopsis-GFP-MAP4 Seedlings under Clinorotation – 60

Kordyum, Elizabeth L.
Simulated Microgravity Affects the Plant Nucleolar Protein NopA100 – 50

Kordyum, Elizabeth
Clinorotation Affects the Microtubule Organization in Root Epidermis and Cortex Cells in Brassica Rapa Seedlings – 60

Long-Term Clinorotation Affects the Amyloplast Structure and Starch Composition in Potato Minitubers – 55

Kornilova, L. N.
The Eye Pursuit Function during Dry Immersion with and without a Compensator of Support Unloading – 63

Koshti, Ajay
Development of Eddy Current Techniques for the Detection of Cracking in Space Shuttle Primary Reaction Control Thrusters – 12

Kozeko, L. Ye.
Altered Gravity Effect on the Heat-Shock Protein Level in Plants – 37

Kozlovskaya, I. B.
Effect of Dry Immersion of Various Durations in Combination with Artificial Stimulation of Foot Support Zones upon Force-Velocity Characteristics of Knee Extensors – 53

The Eye Pursuit Function during Dry Immersion with and without a Compensator of Support Unloading – 63

Krantz, Timothy L.
Investigation of Low-Cycle Bending Fatigue of AISI 9310 Steel Spur Gears – 27

Kreidenweis, Sonia M.
Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle – 33

Kubo, Takeshi
Impaired Spatial Learning after Hypergravity Load in Rats – 62

Microarray Analysis of Hippocampal Gene Expression in Rats Exposed to Hypergravity – 75

Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 53

Kuchner, Marc
General Astrophysics with TPF: Not Just Dark Energy – 81

Kuczmarski, Maria A.
Improved Thermal Design of a Compression Mold – 16

Kumei, Yasuhiro
Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

Phenotypes, Signaling, and Apoptotic Features of Osteoblasts in Microgravity – 54

Kumosa, Maciej S.
Graphite/Polyimide Composites Subjected to Biaxial Loads at Elevated Temperatures – 14

Kurits, Inna
Continued Development of a Global Heat Transfer Measurement System at AEDC Hypervelocity Wind Tunnel 9 – 23

Kuznetz, L. H.
Use of Thermoregulatory Models to Enhance Space Shuttle and Space Station operations and Review of Human Thermoregulatory Control – 44

LaBel, Kenneth A.
A Technical and Cost Perspective on Radiation Testing Challenges – 21

Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 20

Labetskaja, O. I.
Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

Labreuille, Bertrand
Cell Culture Tests in the BIOLAB Flight Model – 51

Sea Urchin Development Test in the BIOLAB Flight Model – 37

Ladbury, Ray
Summary of LET Requirements/Testing – 80

Lagoudas, Dimitris C.
Characterization of Nonlinear Rate Dependent Response of Shape Memory Polymers – 19

Lambrigsten, B. H.
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

Lambrigtsen, Bjorn H.
STAR Concept for Passive Microwave Temperature Sounding from Middle Earth Orbit (MeoSTAR) – 30

Lan, Sun
Daily 1-H Standing Can Prevent Changes in A0 and ATIR Expressions in Arterial Tissues of Simulated Microgravity Rats – 56

Lan, Yong bo
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 50

Lan, Yong Bo
Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

Lan, Yongbo
Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

Lang, R. M.
Evaluation of Changes in Left Ventricular Early Diastolic Mitral Annular Velocity during Parabolic Flight Using Tissue Doppler Echocardiography – 62

Lang, T.
Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest – 43

Larina, I. M.
Rat Soleus Muscle Properties and Serum 1GF-1 after Hindlimb Unloading and Reloading – 60

Larson, Bill
In-situ Resource Utilization (ISRU) and Lunar Surface Systems – 83

Lawrence, Charles
Astronaut Risk Levels During Crew Module (CM) Land Landing – 10

Le, L.
Al, Ti, and Cr: Complex Zoning in Synthetic and Natural Nakhlite Pyroxenes – 84

Lee, Hyung
Highly Efficient Q-switched Ho:YLF Laser Pumped by Tm:Fiber Laser – 26

Lemarchand, Erick
Non-Invasive Tonometric versus invasive Radial Artery Blood Pressure during Altered Gravity Conditions – 49

Lerch, Bradley A.
Investigation of Low-Cycle Bending Fatigue of AISI 9310 Steel Spur Gears – 27

Levasseur, R.
Sympathetic Beta Antagonist Prevents Bone Mineral Density Decrease Induced by Labyrinthectomy – 48

Lewe, Jung-Ho
Entity-centric Abstraction and Modeling Framework for Transportation Architectures – 4

Lewis, M. J.
Continued Development of a Global Heat Transfer Measurement System at AEDC Hypervelocity Wind Tunnel 9 – 23

LI Chuan-fu
Non-rigid Medical Image Registration Based on the Thin-plate Spline and Shape Context – 39

LI, Shu-xian
Realization of Anisotropic Bone Remodelling Process – 38

LI, Xia
A Scoring Method for Quantitative Assessment of Cardiovascular Health Status Based on Non-linear Parameters – 42

Li, Y. L.
A Behavioral Model of Landscape Change in the Amazon Basin: The Colonist Case – 31

LI, Ying-hui
Oligonucleotide Hybridization Detection Based on Surface Plasmon Resonance Technology – 40

LIANG, Ying
Preliminary Research on Effects of Percutaneous Muscular Electrical Stimulation against Bone Loss in Tail-suspended Rats – 41

Li-Fan, Zhang
Daily 1-H Standing Can Prevent Changes in A0 and ATIR Expressions in Arterial Tissues of Simulated Microgravity Rats – 56

Lim, Jongmook
Flame Radiation, Structure, and Scalar Properties in Microgravity Laminar Fires – 25

Lin, Bin
Retrievals and Comparisons of Various MODIS-Spectrum Inferred Water Cloud Droplet Effective Radii – 29

Lin, Victor
Guidance and Control of an Autonomous Soaring UAV – 8

Ling, James C.
Gamma-ray Spectral Characteristics of Thermal and Non-thermal Emission from Three Black Holes – 80

Littell, Justin
Astronaut Risk Levels During Crew Module (CM) Land Landing – 10

Litvinova, K. S.
Rat Soleus Muscle Properties and Serum 1GF-1 after Hindlimb Unloading and Reloading – 60

Resting Intracellular Calcium Level as a Triggering Signal for Soleus Fiber Alterations during Unloading – 66

Liu, C.
Chromosome Aberrations in Normal and Ataxia-Telangiectasia Cells Exposed to Heavy Ions – 35

LIU, Chen-guang
Design and Implementation of A Portable ECG Monitor for Multi-user – 40

Liu, Jiexin
Heart Rate Reflexes and Arterial Pressure Control after Short-Duration Spaceflight – 70

LIU, Jing-xia
Research Advancement of Superhydrophilic Thin Film in Condensation Heat Regenerators – 75

LIU, Rui-gang
Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment – 42

LIU, Xiang-yang
Development of an Improved Ground-based Prototype of Space Plant-growing Facility – 40

LIU, Xue-yong
Oligonucleotide Hybridization Detection Based on Surface Plasmon Resonance Technology – 40

Lizotte, Andrew M.
Twist Model Development and Results from the Active Aeroelastic Wing F/A-18 Aircraft – 7

Loesberg, W. A.
On Gravity and Grooves – 55

Logan, J. S.
Use of Thermoregulatory Models to Enhance Space Shuttle and Space Station operations and Review of Human Thermoregulatory Control – 44

Luke, Edward
Marine Boundary Layer Cloud Properties From AMF Point Reyes Satellite Observations – 32

Luneva, O. G.
Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

Lvovsky, Oleg
Implementation of Leak Test Methods for the International Space Station (ISS) Elements, Systems and Components – 11

Ma, Jin
Daily 1-H Standing Can Prevent Changes in Calcium Current of Vascular Myocytes Isolated from Small Mesenteric but not Cerebral Arteries after 3-Day Simulated Microgravity in Rats – 57

The Activity of Nitric Oxide Synthase may be Altered by Hindlimb Unweighting in Abdominal Aorta of Rats – 72

MA, Zong-min
Realization of Anisotropic Bone Remodelling Process – 38

Mace, Thomas
The Ground Control Room as an Enabling Technology in the Unmanned Aerial System – 2

MacKintosh, F. C.
Microrheology of Mechanosensitive Bone Cells – 69

Madura, John
Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 5

Maes, Olivier C.
Comparative MicroRNA Expression Patterns in Fibroblasts after Low and High Doses of Low-LET Radiation Exposure – 34

Majima, Hideyuki, J.
Change of Bone Mineral and Morphology in Growing Rat Leg Bone after Hindlimb Unloading – 65

Maksimov, G. V.
Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

Maksimova, N. V.
Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

Malyshev, A. Y.
Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

Mann, Troy
Structural Test and Analysis of a Hybrid Inflatable Antenna – 20

Manning, Carol A.
Relationship of Complexity Factor Ratings with Operational Errors – 2

Manuilova, E. S.
The Effects of Gravity Vector Randomization on Mouse Embryonic Stem Cells in vitro – 51

Manzo, Michelle A.
An Update on the Lithium-Ion Cell Low-Earth-Orbit Verification Test Program – 18

Marshall, Curtis H.
A New Paradigm for Assessing the Role of Agriculture in the Climate System and in Climate Change – 34

Marthy, Hans-Juerg
Sea Urchin Development Test in the BIOLAB Flight Model – 37

Martin, Richard E.
A Software Platform for Post-Processing Waveform-Based NDE – 77

Martinson, V. G.
Influence of Space Flight Factors on the Genetic Properties of Streptomyces Lividans 66 (PIJ702) – 67

Martyn, Galina
Long-Term Clinorotation Affects the Amyloplast Structure and Starch Composition in Potato Minitubers – 55

Masini, M. A.
Effects of Modeled Microgravity on Rat Testis – 65

Masuda, Kyojiro
Effects of Hypergravity Stimulus on Primary Xylem Development and Mechanical Properties of Secondary Cell Walls in Inflorescence Stems of Arabidopsis Thaliana L. – 36

Masumura, Chisako
Impaired Spatial Learning after Hypergravity Load in Rats – 62

Microarray Analysis of Hippocampal Gene Expression in Rats Exposed to Hypergravity – 75

Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 53

Masunaga, Hirohiko
Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle – 33

Mathis, Dylan
The Effects of Radiation on Imagery Sensors in Space – 85

Matsuda, Tomoko
Role of the Vestibular System in Arterial Pressure Response to Gravitational Stress – 71

Matsui, Toshihisa
A New Paradigm for Assessing the Role of Agriculture in the Climate System and in Climate Change – 34

Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle – 33

Matsumoto, Akike
Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery – 65

Matsunoka, Yoshikazu
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 50

Matsuoka, Yoshikazu
Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

Mattar, L.
WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

Maughan, B. J.
The Evolution of the Cluster X-ray Scaling Relations in the Wide Angle ROSAT Pointed Survey Sample at – 81

Mavris, Dimitri N.
Entity-centric Abstraction and Modeling Framework for Transportation Architectures – 4

McCardle, Kenneth
A Method for Determining Autoignition Temperatures Resulting from Varying Rapid Rise Rates – 27

McCoy, T.
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

McDougle, Stephen
A Method for Determining Autoignition Temperatures Resulting from Varying Rapid Rise Rates – 27

McKay, G.
Al, Ti, and Cr: Complex Zoning in Synthetic and Natural Nakhlite Pyroxenes – 84

McKay, Terri L.
Microvascular Branching as a Determinant of Blood Flow by Intravital Particle Imaging Velocimetry – 36

McKissock, Barbara I.
An Update on the Lithium-Ion Cell Low-Earth-Orbit Verification Test Program – 18

McLemore, Carole
Development Issues for Lunar Regolith Simulants – 82

Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program – 82

McNamra, A. J.
Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Meador, Michael A.
Polymeric Materials for Aerospace Power and Propulsion: Overview of Polymer Research at NASA Glenn – 13

Medina, Francisco Javier
Simulated Microgravity Affects the Plant Nucleolar Protein NopA100 – 50

Mehta, Satish
Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

Mendoza, J. M.
Implementation of In-Situ Impedance Techniques on a Full Scale Aero-Engine System – 6

Merati, Giampiero
A New Wearable System for Cardiorespiratory Monitoring during Gravitational Stress – 48

Autonomic Adaptation to a Microgravity-Like Environment in Pregnant Women – 59

Mercer, Carolyn R.
Fundamental Technology Development for Gas-Turbine Engine Health Management – 6

Meyer, Stephen
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

Mikhailov, Valery M.
Effect of the Lower Body Negative Pressure (LBNP) Test on the Mirocirculation of Healthy Volunteers and Patients with Coronary Artery Disease – 66

Miki, Kenju
Baroreflexes and Renal Function – 53

Miki, Takeo
A Trial for Studying Effects of Gravity on the Fetus – 46

Mikouchi, T.
Al, Ti, and Cr: Complex Zoning in Synthetic and Natural Nakhlite Pyroxenes – 84

Mikuliszyn, R.
Push-Pull Centrifuge Training for the Polish Pilots: Two Years' Experience – 45

Miller, Christopher A.
Comparison of Two Alternate Methods for Tracking Toe Clearance – 74

Miller, Mark A.
Marine Boundary Layer Cloud Properties From AMF Point Reyes Satellite Observations – 32

Miller, Thomas B.
An Update on the Lithium-Ion Cell Low-Earth-Orbit Verification Test Program – 18

Ming, D.
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

Minnis, Patrick
A Comparison of Satellite-Based Multilayered Cloud Detection Methods – 33

Comparison of TWP-ICE Satellite and Field Campaign Aircraft Derived Cloud Properties – 33

Marine Boundary Layer Cloud Properties From AMF Point Reyes Satellite Observations – 32

Retrievals and Comparisons of Various MODIS-Spectrum Inferred Water Cloud Droplet Effective Radii – 29

Mishchenko, L. A.
The Effects of Clinorotation on the Process of Viral Infection in Potato Plants – 51

Mishchenko, L. T.
The Effects of Clinorotation on the Process of Viral Infection in Potato Plants – 51

Mitani, Kenji
Impaired Spatial Learning after Hypergravity Load in Rats – 62

Microarray Analysis of Hippocampal Gene Expression in Rats Exposed to Hypergravity – 75

Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 53

Mitashov, V. I.
Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

Mitashov, V.
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Mitashov, Victor
Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

Mittlefehldt, D.
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

Miyachi, Ei-Ichi
Eye Movements of Flatfish for the Changes of Gravity – 49

Miyake, Masao
Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

Miyamoto, Kensuke
Auxin Polar Transport is Essentially Required for Graviresponse in Early Growth Stage of Etiolated Pea Seedlings – 52

Mizuno, D.
Microrheology of Mechanosensitive Bone Cells – 69

Mobed, D.
Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

Montufar-Solis, D.
Human Bone-Forming Chondrocytes Cultured in the Hydrodynamic Focusing Bioreactor Retain Matrix Proteins: Similarities to Spaceflight Results – 61

Morey-Holton, E.
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Mori, Shigeo
Living in Greenhouse Built on Mars – 46

Morikuni, Sayaka
Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

Morita, Hironobu
Role of the Vestibular System in Arterial Pressure Response to Gravitational Stress – 71

Roles of Vestibular and Somatosensory System in Controlling Arterial Pressure during Free Drop-Induced Microgravity – 59

Morris, R.
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

Morukov, B. V.
Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

Moseley, Harvey
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

Mueller, Robert
The Environmental Performance at Low Intensity, Low Temperature (LILT) of High Efficiency Triple Junction Solar Cells – 22

Muir, J. W.
Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest – 43

Mukhina, A. M.
Resting Intracellular Calcium Level as a Triggering Signal for Soleus Fiber Alterations during Unloading – 66

Murthy, Pappu L. N.
Composite Overwrap Pressure Vessels: Mechanics and Stress Rupture Lifing Philosophy – 16

Musko, S.
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

Myers, Jerry G.
Microvascular Branching as a Determinant of Blood Flow by Intravital Particle Imaging Velocimetry – 36

Nagayama, Tadanori
Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

Nakabayashi, Izumi
Effects of Hypergravity Stimulus on Primary Xylem Development and Mechanical Properties of Secondary Cell Walls in Inflorescence Stems of Arabidopsis Thaliana L. – 36

Nakagawa, Aya
Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 53

Nakai, Naoya
Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

Nakano, Norihiko
Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

Natalia, Krisanova
Ground-Based Hypergravity Simulated Modeling Changed the Effects of the Glutamate Transporter Inhibitor on the Carrier-Mediated Glutamate Release in Low [Na+] Media from Rat Brain Nerve Terminals – 70

Naumov, I. A.
The Eye Pursuit Function during Dry Immersion with and without a Compensator of Support Unloading – 63

Nedukha, Olena
Long-Term Clinorotation Affects the Amyloplast Structure and Starch Composition in Potato Minitubers – 55

Nemirovskaya, T. L.
Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

Resting Intracellular Calcium Level as a Triggering Signal for Soleus Fiber Alterations during Unloading – 66

Netreba, A. I.
Effect of Dry Immersion of Various Durations in Combination with Artificial Stimulation of Foot Support Zones upon Force-Velocity Characteristics of Knee Extensors – 53

Netsu, Yahiro
A Trial for Studying Effects of Gravity on the Fetus – 46

Nguyen, Louis
Comparison of TWP-ICE Satellite and Field Campaign Aircraft Derived Cloud Properties – 33

Marine Boundary Layer Cloud Properties From AMF Point Reyes Satellite Observations – 32

Niedra, Janis M.
Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 21

Nielsen, Soren
Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

Nikitin, V. B.
Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

Nikonova, T. M.
Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

Ning, Gang-min
Spectral Analysis of Pulse Transit Time Variability – 42

Nishimoti, Norhiro
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 50

Nishiuchi, Takumi
Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana – 63

Niyogi, Dev
A New Paradigm for Assessing the Role of Agriculture in the Climate System and in Climate Change – 34

Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

Noll, Carey
International Laser Ranging Service (ILRS) 2003-2004 Annual Report – 29

Noll, Thomas E.
Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 5

Nordeen, Michele L.
A Comparison of Satellite-Based Multilayered Cloud Detection Methods – 33

Comparison of TWP-ICE Satellite and Field Campaign Aircraft Derived Cloud Properties – 33

Normand, Here
Non-Invasive Tonometric versus invasive Radial Artery Blood Pressure during Altered Gravity Conditions – 49

Norris, Joseph D.
Continued Development of a Global Heat Transfer Measurement System at AEDC Hypervelocity Wind Tunnel 9 – 23

Noszek, Annamaria
3D Reconstruction in the Cerebellar Cortex as an Effective Tool to Investigate Neuronal Plasticity – 62

Numata, Kenji
Coated Fused Silica Fibers for Enhanced Sensitivity Torsion Pendulum – 14

Oborn, Kelli D.
Multi-Functional Sandwich Composites for Spacecraft Applications: An Initial Assessment – 17

Ochiai, Toshimasa
Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

Ogasawara, Masahiro
Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

Ogura, Akihiko
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 50

Ohira, Takashi
Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

Ohira, Yoshinobu
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 50

Change of Bone Mineral and Morphology in Growing Rat Leg Bone after Hindlimb Unloading – 65

Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery – 65

Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

Effects of Tenotomy and/or Denervation on the Characteristics of Plantaris Muscle Fibers of MDX Mice – 61

Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

Ohno, Hideki
Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

Oke, Yoshihiko
Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

Okshtein, I. L.
Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

Oldham, Daniel R.
JTRS/SCA and Custom/SDR Waveform Comparison – 9

Oleksandr, Talalaiev
Expression Messenger RNA of Two Cytosolic Small Heat Shock Proteins under Clinorotation – 37

Owens, Charles
Development Issues for Lunar Regolith Simulants – 82

Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program – 82

Palikonda, Rabindra
A Comparison of Satellite-Based Multilayered Cloud Detection Methods – 33

Comparison of TWP-ICE Satellite and Field Campaign Aircraft Derived Cloud Properties – 33

Marine Boundary Layer Cloud Properties From AMF Point Reyes Satellite Observations – 32

Parati, Gianfranco
A New Wearable System for Cardiorespiratory Monitoring during Gravitational Stress – 48

Parshina, E. Yu.
Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

Parsons-Wingerter, Patricia
Microvascular Branching as a Determinant of Blood Flow by Intravital Particle Imaging Velocimetry – 36

Pascaud, L.
Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume – 59

Pastorino, M.
Effects of Modeled Microgravity on Rat Testis – 65

Paxson, Daniel E.
Experimental Investigation of Unsteady Thrust Augmentation Using a Speaker-Driven Jet – 25

Payushina, O. V.
Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

Pearce, Mike
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

Pearlman, Michael
International Laser Ranging Service (ILRS) 2003-2004 Annual Report – 29

Pefferkorn, Alexandre
Cell Culture Tests in the BIOLAB Flight Model – 51

Sea Urchin Development Test in the BIOLAB Flight Model – 37

PENG, liang
Preliminary Research on Effects of Percutaneous Muscular Electrical Stimulation against Bone Loss in Tail-suspended Rats – 41

Perez, Horacio, III
Test 6, Test 7, and Gas Standard Analysis Results – 17

Perez-Davis, Marla E.
Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 5

Peters, Wanda C.
Weathering of Thermal Control Coatings – 14

Peterson, Laurie J.
Overview of Potable Water Systems on Spacecraft Vehicles and Applications for the Crew Exploration Vehicle (CEV) – 76

Petricek, J.
Testing Methods of Push-Pull Effect – 64

Petros, M.
Highly Efficient Q-switched Ho:YLF Laser Pumped by Tm:Fiber Laser – 26

Petros, Mulugeta
2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

Pettegrew, Richard D.
Electronic Repair Concepts for Long-Duration Spaceflight – 22

Repair of Electronics for Long Duration Spaceflight – 7

Petzar, Paul
2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

Highly Efficient Q-switched Ho:YLF Laser Pumped by Tm:Fiber Laser – 26

Pfleiderer, Elaine M.
Relationship of Complexity Factor Ratings with Operational Errors – 2

Phan, Anthony
Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 20

Phan, Dung N.
Comparison of TWP-ICE Satellite and Field Campaign Aircraft Derived Cloud Properties – 33

Phillips, J. A.
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Phoenix, Leigh
Composite Overwrap Pressure Vessels: Mechanics and Stress Rupture Lifing Philosophy – 16

Pielke, Roger A., Sr.
A New Paradigm for Assessing the Role of Agriculture in the Climate System and in Climate Change – 34

Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle – 33

Piepmeier, J. R.
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

Piepmeier, Jeffrey R.
STAR Concept for Passive Microwave Temperature Sounding from Middle Earth Orbit (MeoSTAR) – 30

Pierson, Duane
Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

Pisacane, V. L.
Use of Thermoregulatory Models to Enhance Space Shuttle and Space Station operations and Review of Human Thermoregulatory Control – 44

Pizzini, Giuliano
Autonomic Adaptation to a Microgravity-Like Environment in Pregnant Women – 59

Poivey, C.
Texas Instruments-Digital Signal Processor(TI-DSP)SMJ320F20 SEL Testing – 85

Poivey, Christian
Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 20

Polzin, K. A.
Liquid-Metal Pump Technologies for Nuclear Surface Power – 13

Poplinskaya, Valentina
Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

Poplinskaya, V.
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Popova, A. F.
Histochemical Research of Brassica Rapa Embryos at the Different Stages of Development under Clinorotation – 61

Popova, Y.
Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

Prados, Don
A Rapidly Prototyped Vegetation Dryness Index Evaluated for Wildfire Risk Assessment at Stennis Space Center – 28

Prather, C. Daniel
The Council on Aviation Accreditation – 3

Prato, P.
Effects of Modeled Microgravity on Rat Testis – 65

Price, Cahterine
Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

Price, Catherine
Anesthesia during and Immediately after Spaceflight – 71

Puettmann, Britta
Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

Purdy, Ralph E.
The Activity of Nitric Oxide Synthase may be Altered by Hindlimb Unweighting in Abdominal Aorta of Rats – 72

Pursley, Scott
Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 20

Putcha, Lakshmi
Determination of Scopolamine in Human Saliva Using Solid Phase Extraction and LC/MS/MS – 44

Pyle, B. H.
Influence of Space Flight Factors on the Genetic Properties of Streptomyces Lividans 66 (PIJ702) – 67

QI, Lin
Design and Implementation of A Portable ECG Monitor for Multi-user – 40

QIN, Li-feng
Development of an Improved Ground-based Prototype of Space Plant-growing Facility – 40

Qin, Y.
Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest – 43

Quarck, Gaelle
Non-Invasive Tonometric versus invasive Radial Artery Blood Pressure during Altered Gravity Conditions – 49

Quinn, Ed
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

Rabideau, Gregg
Safe Agents in Space: Lessons from the Autonomous Sciencecraft Experiment – 11

Radhakrishnan, Krishnan
Microvascular Branching as a Determinant of Blood Flow by Intravital Particle Imaging Velocimetry – 36

Radil, Kevin C.
Design, Fabrication and Performance of Open Source Generation I and II Compliant Hydrodynamic Gas Foil Bearings – 27

Rampichini, Susanna
Autonomic Adaptation to a Microgravity-Like Environment in Pregnant Women – 59

Rapchun, David A.
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

Ray, Knute
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

Razia, R. N.
Effect of Gravity on the Cardiovascular System – 68

Reid, Concha M.
An Update on the Lithium-Ion Cell Low-Earth-Orbit Verification Test Program – 18

Rein, Zhi-ying
A Scoring Method for Quantitative Assessment of Cardiovascular Health Status Based on Non-linear Parameters – 42

Reithmaier, Karl
2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

Ren, Xinling
The Activity of Nitric Oxide Synthase may be Altered by Hindlimb Unweighting in Abdominal Aorta of Rats – 72

Reveley, Mary S.
Fundamental Technology Development for Gas-Turbine Engine Health Management – 6

Ricci, F.
Effects of Modeled Microgravity on Rat Testis – 65

Rickman, Doug
Development Issues for Lunar Regolith Simulants – 82

Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program – 82

Rittweger, Joern
Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

Rizzo, Francesco
A New Wearable System for Cardiorespiratory Monitoring during Gravitational Stress – 48

Roden, C.
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Rodionov, D.
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

Rogacki, S.
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

Rohde, Larry
Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

Rosales, Keisa R.
Guide for Oxygen Compatibility Assessments on Oxygen Components and Systems – 26

Roselli, Mariangela
Autonomic Adaptation to a Microgravity-Like Environment in Pregnant Women – 59

Ross, Kenton W.
Assessing Hurricane Katrina Vegetation Damage at Stennis Space Center using IKONOS Image Classification Techniques – 32

Ross, Kenton
A Rapidly Prototyped Vegetation Dryness Index Evaluated for Wildfire Risk Assessment at Stennis Space Center – 28

Roth, Donald J.
A Software Platform for Post-Processing Waveform-Based NDE – 77

Rubin, C.
Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest – 43

Ruf, C. S.
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

Ruf, Chris S.
STAR Concept for Passive Microwave Temperature Sounding from Middle Earth Orbit (MeoSTAR) – 30

Sabatier, J. P.
Sympathetic Beta Antagonist Prevents Bone Mineral Density Decrease Induced by Labyrinthectomy – 48

Sabnis, S. M.
Effect of Gravity on the Cardiovascular System – 68

Sacksteder, Kurt
In-situ Resource Utilization (ISRU) and Lunar Surface Systems – 83

Sagalovich, S. V.
The Eye Pursuit Function during Dry Immersion with and without a Compensator of Support Unloading – 63

Saganti, P. B.
Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis – 44

Sakurai, Takuya
Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

Salanova, Michele
Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

Samarova, A. I.
Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

Sanders, Anthony B.
Texas Instruments-Digital Signal Processor(TI-DSP)SMJ320F20 SEL Testing – 85

Sanders, Anthony
Single Event Transients in Voltage Regulators for FPGA Power Supply Applications – 20

Sanders, Jerry
In-situ Resource Utilization (ISRU) and Lunar Surface Systems – 83

Santosh, B.
Effect of Gravity on the Cardiovascular System – 68

Sargsyan, Ashot E.
Diagnostic Imaging in the Medical Support of the Future Missions to the Moon – 43

Sato, Kohei
Unilateral Lower Limb Suspension Induced Atrophy as a Model of Unweighting – 66

Sato, Yu
Change in Spatial Orientation of Optokinetic Nystagmus and Optokinetic After-Nystagmus in Cats under Side-Down Tilt Conditions – 50

Sauerwein, Timothy A.
Integration and Testing Challenges of Small Satellite Missions: Experiences from the Space Technology 5 Project – 10

Saulsberry, Regor
A Method for Determining Autoignition Temperatures Resulting from Varying Rapid Rise Rates – 27

Characterization of Kevlar Using Raman Spectroscopy – 17

Saveliev, S. V.
Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

Saveliev, S.
Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Sayir, Ali
Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 21

Scardelletti, Maximilian C.
JTRS/SCA and Custom/SDR Waveform Comparison – 9

Scharf, C.
The Evolution of the Cluster X-ray Scaling Relations in the Wide Angle ROSAT Pointed Survey Sample at – 81

Schichtel, Bret
Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

Schiffl, Gudrun
Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

Schmidt, C. F.
Microrheology of Mechanosensitive Bone Cells – 69

Schmidt, M.
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

Schnyukova, Elizaveta
Long-Term Clinorotation Affects the Amyloplast Structure and Starch Composition in Potato Minitubers – 55

Schoser, Benedikt
Human Skeletal Muscle Deconditioning and Exercise Countermeasure: Lessons Learnt from Bed Rest Studies – 57

Schrage, Daniel P.
Entity-centric Abstraction and Modeling Framework for Transportation Architectures – 4

Schroeder, C.
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

Searby, N.
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Seebo, Jeff P.
A Software Platform for Post-Processing Waveform-Based NDE – 77

Seki, Takaharu
Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

Seubert, Christoph N.
Anesthesia during and Immediately after Spaceflight – 71

Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

Shah, P. N.
Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

SHANG, Yu
Preliminary Research on Effects of Percutaneous Muscular Electrical Stimulation against Bone Loss in Tail-suspended Rats – 41

SHEN, Jun-yi
Design and Implement of the ECLSS Adaptive Learning Intelligent Decision Support System – 75

Shenkman, B. S.
Rat Soleus Muscle Properties and Serum 1GF-1 after Hindlimb Unloading and Reloading – 60

Resting Intracellular Calcium Level as a Triggering Signal for Soleus Fiber Alterations during Unloading – 66

Sherwood, Rob
Safe Agents in Space: Lessons from the Autonomous Sciencecraft Experiment – 11

Shevchenko, G.
Interrelation Between Cytoskeleton Elements in Root Cells of Arabidopsis-GFP-MAP4 Seedlings under Clinorotation – 60

SHI, Hai-wen
A Study of Pointing Movement Characteristics and Ergonomics on Front Board – 38

SHI, Xue-tao
Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment – 42

Study on Homogeneous Head Phantoms Based on Electrical Impedance Tomography – 39

Shigematsu, N.
Chromosome Aberrations in Normal and Ataxia-Telangiectasia Cells Exposed to Heavy Ions – 35

Shimamiya, Tamiyasu
Change in Spatial Orientation of Optokinetic Nystagmus and Optokinetic After-Nystagmus in Cats under Side-Down Tilt Conditions – 50

Shimazu, Toru
Comparison of Cell Body Size and Oxidative Enzyme Activity in Motoneurons Between the Cervical and Lumbar Segments in the Rat Spinal Cord after Spaceflight and Recovery – 65

Shimizu, Tsuyoshi
A Trial for Studying Effects of Gravity on the Fetus – 46

Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

Shin, Eugene E.
Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 21

Shoemaker, J. K.
WISE-2005: Adrenergic Responses Before and After 60 Days of 6 Degree Head-Down Bed-Rest in Women – 55

WISE-2005 Protective Effect of Exercise within LBNP Countermeasure Detected by Heart Rate Response to Low Levels of LBNP – 69

Shoffstall, Michael S.
Guide for Oxygen Compatibility Assessments on Oxygen Components and Systems – 26

SHUAI, Wan-jun
Study on Homogeneous Head Phantoms Based on Electrical Impedance Tomography – 39

Sibille, Laurent
Development Issues for Lunar Regolith Simulants – 82

Materials Requirements for Standard Lunar Highlands Regolith Simulants as Defined by the NASA Simulant Development Program – 82

Simon, Donald L.
Fundamental Technology Development for Gas-Turbine Engine Health Management – 6

Simon, Laszlo
3D Reconstruction in the Cerebellar Cortex as an Effective Tool to Investigate Neuronal Plasticity – 62

Simpson, John W.
Development of Eddy Current Techniques for the Detection of Cracking in Space Shuttle Primary Reaction Control Thrusters – 12

Singh, U.
Highly Efficient Q-switched Ho:YLF Laser Pumped by Tm:Fiber Laser – 26

Singh, Upendra N.
2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

Sipes, William
A Method for Determining Autoignition Temperatures Resulting from Varying Rapid Rise Rates – 27

Sivathanu, Yudaya
Flame Radiation, Structure, and Scalar Properties in Microgravity Laminar Fires – 25

Skidmore, Michael G.
Foton-M2 Russian/US Biology Experiments - Development, Implementation, and Operations – 9

Smialek, James L.
Sulfur and Moisture Effects on Alumina Scale and TBC Spallation – 15

Smit, Theo H.
Microrheology of Mechanosensitive Bone Cells – 69

Smith, Arthur H.
Journal of Gravitational Physiology, Volume 13, No. 1 – 45

Sobol, Margarita A.
Simulated Microgravity Affects the Plant Nucleolar Protein NopA100 – 50

Soga, Kouichi
Effects of Hypergravity Stimulus on Primary Xylem Development and Mechanical Properties of Secondary Cell Walls in Inflorescence Stems of Arabidopsis Thaliana L. – 36

Spakovszky, Z. S.
Aero-acoustics of Drag Generating Swirling Exhaust Flows – 79

Spangenberg, Douglas A.
A Comparison of Satellite-Based Multilayered Cloud Detection Methods – 33

Comparison of TWP-ICE Satellite and Field Campaign Aircraft Derived Cloud Properties – 33

Spelat, Renza
Cell Culture Tests in the BIOLAB Flight Model – 51

Spruce, Joseph P.
Assessing Hurricane Katrina Vegetation Damage at Stennis Space Center using IKONOS Image Classification Techniques – 32

Spruce, Joseph
A Rapidly Prototyped Vegetation Dryness Index Evaluated for Wildfire Risk Assessment at Stennis Space Center – 28

Spuckler, Charles M.
Effect of an Opaque Reflecting Layer on the Thermal Behavior of a Thermal Barrier Coating – 15

Sreekantamurthy, Tham
Structural Test and Analysis of a Hybrid Inflatable Antenna – 20

Stella, Paul M.
The Environmental Performance at Low Intensity, Low Temperature (LILT) of High Efficiency Triple Junction Solar Cells – 22

Steven Snyder, John
Performance Characterization and Vibration Testing of 30-cm Carbon-Carbon Ion Optics – 80

Stoltzfus, Joel M.
Guide for Oxygen Compatibility Assessments on Oxygen Components and Systems – 26

Strollo, F.
Effects of Modeled Microgravity on Rat Testis – 65

Struk, Peter M.
Electronic Repair Concepts for Long-Duration Spaceflight – 22

Struk, Peter
Repair of Electronics for Long Duration Spaceflight – 7

Studor, George
Lessons Learned JSC Micro-Wireless Instrumentation Systems on Space Shuttle and International Space Station CANEUS 2006 – 12

Sudoh, Masamichi
Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

SUN, Bo-yuan
Preliminary Research on Effects of Percutaneous Muscular Electrical Stimulation against Bone Loss in Tail-suspended Rats – 41

Sun, Hui-Pin
Effects of Intermittent Head-Up Tilt on Endothelin Expression and Morphological Changes of Artery during Simulated Weightlessness in Rabbits – 69

Sun, Xi-Qing
Changes of Mechanotransduction in MG-63 Osteosarcoma Cells Induced by Simulated Weightlessness – 64

Effect of Simulated Weightlessness on the Expression of CBF 1 Induced by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 64

Effects of Intermittent Head-Up Tilt on Endothelin Expression and Morphological Changes of Artery during Simulated Weightlessness in Rabbits – 69

SUN, Xi-qing
Influence of Fluid Shear Stress on Expression of Cbf(alpha)1 in MG-63 Cells Cultured under Simulated Microgravity Condition – 41

Sun, Ziqing
Effects of Self-Generated Lower Body Negative Pressure Training on Cardiovascular Function and Lower Body Negative Pressure Tolerance – 73

Sunny, Sun-Mack
Retrievals and Comparisons of Various MODIS-Spectrum Inferred Water Cloud Droplet Effective Radii – 29

Sutter, J. K.
Graphite/Polyimide Composites Subjected to Biaxial Loads at Elevated Temperatures – 14

Sutter, James K.
Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 21

Suzuki, Hiromi
Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

Suzuki, Kenji
Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

Sweet, Kathleen M.
Emergency Preparedness for Catastrophic Events at Small and Medium Sized Airports: Lacking or Not? – 5

Tabakov, V. Yu.
Influence of Space Flight Factors on the Genetic Properties of Streptomyces Lividans 66 (PIJ702) – 67

Tabakov, Viacheslav Yu.
Comparative Analysis of Life Activity of Microoganisms Exposed to Short-Term Spaceflights – 76

Tacina, Kathleen M.
High Pressure Low NOx Emissions Research: Recent Progress at NASA Glenn Research Center – 19

Tai, Testuo
Reduction of Body Response after 2G Load by Slow Acceleration – 65

Tairbekov, M. G.
Effect of 16-Day Spaceflight on the Morphology of Thick-Toed Geckos (Pachydactylus Bibronii Smith, 1846) – 72

Influence of Space Flight Factors on the Genetic Properties of Streptomyces Lividans 66 (PIJ702) – 67

Spaceflight Effects on Hemopoiesis of Lower Vertebrates Flown on Foton-M2 – 56

Tairbekov, M.
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Tairbekov, Murad G.
Foton-M2 Russian/US Biology Experiments - Development, Implementation, and Operations – 9

Tairbekov, Murad
Experiment 'Regeneration' Performed Aboard the Russian Spacecraft Foton-M2 in 2005 – 67

Takabayashi, Akira
Eye Movements of Flatfish for the Changes of Gravity – 49

Takacs, Jozsef
3D Reconstruction in the Cerebellar Cortex as an Effective Tool to Investigate Neuronal Plasticity – 62

Takeuchi, M.
Evaluation of Changes in Left Ventricular Early Diastolic Mitral Annular Velocity during Parabolic Flight Using Tissue Doppler Echocardiography – 62

Tamaoki, Daisuke
Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana – 63

Effects of Hypergravity Stimulus on Primary Xylem Development and Mechanical Properties of Secondary Cell Walls in Inflorescence Stems of Arabidopsis Thaliana L. – 36

Tanaka, Hidetaka
Does a 16-Day Bed-Rest Cause a Deterioration of Executive Function? – 47

Tanaka, Kunihiko
Role of the Vestibular System in Arterial Pressure Response to Gravitational Stress – 71

Roles of Vestibular and Somatosensory System in Controlling Arterial Pressure during Free Drop-Induced Microgravity – 59

Taniuchi, Shoichiro
Does a 16-Day Bed-Rest Cause a Deterioration of Executive Function? – 47

Tanner, A. B.
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

Tanner, Alan B.
STAR Concept for Passive Microwave Temperature Sounding from Middle Earth Orbit (MeoSTAR) – 30

Tao, Wei-Kuo
Satellite-based Assessment of Global Warm Cloud Properties Associated with Aerosols, Atmospheric Stability, and Diurnal Cycle – 33

Tarakin, P. M.
Rat Soleus Muscle Properties and Serum 1GF-1 after Hindlimb Unloading and Reloading – 60

Tarasova, O. S.
Study of Arterial Blood Pressure Dynamics in Conscious Rats with the Use of Wavelet Analysis – 58

Tarnowski, A.
Push-Pull Centrifuge Training for the Polish Pilots: Two Years' Experience – 45

Tatiana, Borisova
Ground-Based Hypergravity Simulated Modeling Changed the Effects of the Glutamate Transporter Inhibitor on the Carrier-Mediated Glutamate Release in Low [Na+] Media from Rat Brain Nerve Terminals – 70

Temnikova, V. V.
The Eye Pursuit Function during Dry Immersion with and without a Compensator of Support Unloading – 63

Terada, Masahiro
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 50

Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

Terada, Mashiro
Effects of Tenotomy and/or Denervation on the Characteristics of Plantaris Muscle Fibers of MDX Mice – 61

Thesken, John C.
Composite Overwrap Pressure Vessels: Mechanics and Stress Rupture Lifing Philosophy – 16

Thieme, Lanny G.
Materials-of-Construction Radiation Sensitivity for a Fission Surface Power Convertor – 21

TIAN Jia-he
Whole Body Simulation and Visualization of Metabolic Process of 18F 2-fluoro-2-deoxy-D-glucose – 41

Tiffany, Geary C.
Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 5

Toda, Kazuo
Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

Tran, C. C. D.
Cerebral Oxygenation Control is Maintained under Push-pull Effect at Low Gz Level Exposure – 50

Tran, Daniel
Safe Agents in Space: Lessons from the Autonomous Sciencecraft Experiment – 11

Trieu, Bo
2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

Highly Efficient Q-switched Ho:YLF Laser Pumped by Tm:Fiber Laser – 26

Trinh, Long B.
A Software Platform for Post-Processing Waveform-Based NDE – 77

Triolo, Jack J.
Weathering of Thermal Control Coatings – 14

Tuan, George C.
Weathering of Thermal Control Coatings – 14

Turner, R. T.
Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Tuttle, Jim
Low Temperature (30 K) TID Test Results of a Radiation Hardened 128 Channel Serial-to-Parallel Converter – 21

Tuttle, Karen L.
An Overview and Status of NASA's Radioisotope Power Conversion Technology NRA – 12

Ueda, Junichi
Auxin Polar Transport is Essentially Required for Graviresponse in Early Growth Stage of Etiolated Pea Seedlings – 52

Ueno, Satoru
Reduction of Body Response after 2G Load by Slow Acceleration – 65

Umemoto, Shiori
Effects of Tenotomy and/or Denervation on the Characteristics of Plantaris Muscle Fibers of MDX Mice – 61

Underwood, Steve
Implementation of Leak Test Methods for the International Space Station (ISS) Elements, Systems and Components – 11

Uno, Atsuhiko
Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 53

Uno, Yoshihiro
Molecular Changes in the Rat Peripheral and Central Vestibular Systems following Hypergravity – 53

Ushakov, Boris B.
Effect of the Lower Body Negative Pressure (LBNP) Test on the Mirocirculation of Healthy Volunteers and Patients with Coronary Artery Disease – 66

Uva, B. M.
Effects of Modeled Microgravity on Rat Testis – 65

Vaida, P.
Evaluation of Changes in Left Ventricular Early Diastolic Mitral Annular Velocity during Parabolic Flight Using Tissue Doppler Echocardiography – 62

Vaida, Pierre
Non-Invasive Tonometric versus invasive Radial Artery Blood Pressure during Altered Gravity Conditions – 49

Vaksman, Zalman
Determination of Scopolamine in Human Saliva Using Solid Phase Extraction and LC/MS/MS – 44

vanLoon, J. J. W. A.
Microrheology of Mechanosensitive Bone Cells – 69

On Gravity and Grooves – 55

VanZante, Dale E.
Cool and Quiet: Partnering to Enhance the Aerodynamic and Acoustic Performance of Installed Electronics Cooling Fans: A White Paper – 79

Vasigh, Bijan
Productivity Analysis of Public and Private Airports: A Causal Investigation – 3

Vasques, Marilyn F.
Foton-M2 Russian/US Biology Experiments - Development, Implementation, and Operations – 9

Veicsteinas, Arsenio
Autonomic Adaptation to a Microgravity-Like Environment in Pregnant Women – 59

Vercoutere, W.
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Development of the Gecko (Pachydactylus turneri) Animal Model during Foton M-2 to Study Comparative Effects of Microgravity in Terrestrial and Aquatic Organisms – 71

Vergara, D.
A Behavioral Model of Landscape Change in the Amazon Basin: The Colonist Case – 31

Verheyden, Bart
Heart Rate Reflexes and Arterial Pressure Control after Short-Duration Spaceflight – 70

Verma, Nikhil
Design of an Auto-zeroed, Differential, Organic Thin-film Field-effect Transistor Amplifier for Sensor Applications – 23

Vickerman, Mary B.
Microvascular Branching as a Determinant of Blood Flow by Intravital Particle Imaging Velocimetry – 36

Vidyasagar, P. B.
Effect of Gravity on the Cardiovascular System – 68

Viguier, F.
Motorized Echographic Probe Holder for Evaluating Thigh Muscle Volume – 59

Vinogradova, O. L.
Effect of Dry Immersion of Various Durations in Combination with Artificial Stimulation of Foot Support Zones upon Force-Velocity Characteristics of Knee Extensors – 53

Study of Arterial Blood Pressure Dynamics in Conscious Rats with the Use of Wavelet Analysis – 58

Voeikova, T. A.
Influence of Space Flight Factors on the Genetic Properties of Streptomyces Lividans 66 (PIJ702) – 67

Voeikova, Tatiana A.
Comparative Analysis of Life Activity of Microoganisms Exposed to Short-Term Spaceflights – 76

Vogelmann, Andrew M.
Marine Boundary Layer Cloud Properties From AMF Point Reyes Satellite Observations – 32

Volk, Brent
Characterization of Nonlinear Rate Dependent Response of Shape Memory Polymers – 19

Vorobyova, Tamara
Fluidity of Plasma Membranes of Pea Seedling Roots under Clinorotation – 47

Vorontzov, D. D.
Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

Wakasugi, Tatsuya
Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana – 63

Waki, Hidefumi
Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

Walboomers, X. F.
On Gravity and Grooves – 55

Walker, James L.
A Software Platform for Post-Processing Waveform-Based NDE – 77

Walker, R. A.
A Behavioral Model of Landscape Change in the Amazon Basin: The Colonist Case – 31

Wang, Bing
Changes of Mechanotransduction in MG-63 Osteosarcoma Cells Induced by Simulated Weightlessness – 64

Effect of Simulated Weightlessness on the Expression of CBF 1 Induced by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 64

Effects of Intermittent Head-Up Tilt on Endothelin Expression and Morphological Changes of Artery during Simulated Weightlessness in Rabbits – 69

Effects of Simulated Weightlessness on the Kinase Activity of MEK1 Induced by BMP-2 in Rat Osteosarcoma Cells – 47

Effects of Simulated Weightlessness on the Kinase Activity of MEKl Induced by BMP-2 in Rat Osteosarcoma Cells – 70

WANG, Bing
Influence of Fluid Shear Stress on Expression of Cbf(alpha)1 in MG-63 Cells Cultured under Simulated Microgravity Condition – 41

WANG, Chun-yan
Oligonucleotide Hybridization Detection Based on Surface Plasmon Resonance Technology – 40

WANG, Cong
Study on Homogeneous Head Phantoms Based on Electrical Impedance Tomography – 39

Wang, Eugenia
Comparative MicroRNA Expression Patterns in Fibroblasts after Low and High Doses of Low-LET Radiation Exposure – 34

WANG, Guang-zhi
Preliminary Research on Effects of Percutaneous Muscular Electrical Stimulation against Bone Loss in Tail-suspended Rats – 41

Wang, Pan
Changes of Mechanotransduction in MG-63 Osteosarcoma Cells Induced by Simulated Weightlessness – 64

Wang, Xiao Dong
Blockade of Interleukin-6 Signaling Pathway Promotes Muscle Cell Differentiation – 50

Mechanical Stress-Dependent Transformation of Nucleoli in Myonuclei of Rat Soleus Muscle Fibers – 49

Responses of Adductor Longus Muscle to Hindlimb Suspension in Wistar Hannover Rats – 56

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

Wang, Xiaodong
Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

WANG, Xiao-xia
Development of an Improved Ground-based Prototype of Space Plant-growing Facility – 40

Wang, Yongchun
Effects of Self-Generated Lower Body Negative Pressure Training on Cardiovascular Function and Lower Body Negative Pressure Tolerance – 73

Wang, Zuwei
Determination of Scopolamine in Human Saliva Using Solid Phase Extraction and LC/MS/MS – 44

Washer, Glenn
Characterization of Kevlar Using Raman Spectroscopy – 17

Watanabe, Sumiko
Role(s) of Gravitational Loading on the Transcription Regulation of Gene Expression in Rat Brown Adipose Tissue during Growing Period – 48

Webb, Nicholas Jason
Multi-Functional Sandwich Composites for Spacecraft Applications: An Initial Assessment – 17

WEI, Min
Development of an Improved Ground-based Prototype of Space Plant-growing Facility – 40

Weinert, L.
Evaluation of Changes in Left Ventricular Early Diastolic Mitral Annular Velocity during Parabolic Flight Using Tissue Doppler Echocardiography – 62

Wei-Quan, Huang
Daily 1-H Standing Can Prevent Changes in A0 and ATIR Expressions in Arterial Tissues of Simulated Microgravity Rats – 56

Wernet, Mark P.
Experimental Investigation of Unsteady Thrust Augmentation Using a Speaker-Driven Jet – 25

Microvascular Branching as a Determinant of Blood Flow by Intravital Particle Imaging Velocimetry – 36

Time-Resolved PIV for Space-Time Correlations in Hot Jets – 24

Westheimer, David T.
Weathering of Thermal Control Coatings – 14

Wey, Changlie
High Pressure Low NOx Emissions Research: Recent Progress at NASA Glenn Research Center – 19

Wheaton, William A.
Gamma-ray Spectral Characteristics of Thermal and Non-thermal Emission from Three Black Holes – 80

Whitley, Karen S.
Characterization of Nonlinear Rate Dependent Response of Shape Memory Polymers – 19

Wi, J. G.
A Behavioral Model of Landscape Change in the Amazon Basin: The Colonist Case – 31

Wierzbanowski, Ted
Technical Findings, Lessons Learned, and Recommendations Resulting from the Helios Prototype Vehicle Mishap – 5

Wilkins, R.
Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis – 44

Williams, David E.
International Space Station Environmental Control and Life Support System Status: 2006 - 2007 – 76

Williams-Hayes, Peggy S.
Flight Test Results from the NF-15B Intelligent Flight Control System (IFCS) Project with Adaptation to a Simulated Stabilator Failure – 2

Wilson, W. J.
Prototype development of a Geostationary Synthetic Thinned Aperture Radiometer, GeoSTAR – 30

Wilson, William J.
STAR Concept for Passive Microwave Temperature Sounding from Middle Earth Orbit (MeoSTAR) – 30

Wilton, Donald R.
An Improved Transformation and Optimized Sampling Scheme for the Numerical Evaluation of Singular and Near-Singular Potentials – 78

Wincheski, Buzz A.
Development of Eddy Current Techniques for the Detection of Cracking in Space Shuttle Primary Reaction Control Thrusters – 12

Winfree, William P.
A Software Platform for Post-Processing Waveform-Based NDE – 77

Wissler, E. H.
Use of Thermoregulatory Models to Enhance Space Shuttle and Space Station operations and Review of Human Thermoregulatory Control – 44

Wong, Wayne A.
An Overview and Status of NASA's Radioisotope Power Conversion Technology NRA – 12

Woodward, Jennifer J.
Effects of Simulated Microgravity on the Anesthetic Properties of Propofol: A Randomized Crossover Study of Pharmacokinetics and Pharmacodynamics – 46

Wu, H.
Chromosome Aberrations in Human Epithelial Cells Exposed Los Alamos High-Energy Secondary Neutrons: M-BAND Analysis – 44

Wu, Honglu
Comparative MicroRNA Expression Patterns in Fibroblasts after Low and High Doses of Low-LET Radiation Exposure – 34

Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

Wu, Xing-Yu
Effects of Simulated Weightlessness on the Kinase Activity of MEK1 Induced by BMP-2 in Rat Osteosarcoma Cells – 47

Effects of Simulated Weightlessness on the Kinase Activity of MEKl Induced by BMP-2 in Rat Osteosarcoma Cells – 70

Wu, Yan-Hong
Effects of Simulated Weightlessness on the Kinase Activity of MEK1 Induced by BMP-2 in Rat Osteosarcoma Cells – 47

Effects of Simulated Weightlessness on the Kinase Activity of MEKl Induced by BMP-2 in Rat Osteosarcoma Cells – 70

Xia, Y.
Low Magnitude Mechanical Signals Reduce Risk-Factors for Fracture during 90-Day Bed Rest – 43

Xiao, Dong Wang
Effects of Acute Exposure to Microgravity or Hypergravity Environment on Motor Control of Arm in Human – 54

Xiao-xi Wang
Non-rigid Medical Image Registration Based on the Thin-plate Spline and Shape Context – 39

Xie, Man-Jiang
Daily 1-H Standing Can Prevent Changes in Calcium Current of Vascular Myocytes Isolated from Small Mesenteric but not Cerebral Arteries after 3-Day Simulated Microgravity in Rats – 57

XU, Can-hua
Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment – 42

Xu, Suying
Comparative MicroRNA Expression Patterns in Fibroblasts after Low and High Doses of Low-LET Radiation Exposure – 34

Xue, Jun-Hiu
Daily 1-H Standing Can Prevent Changes in Calcium Current of Vascular Myocytes Isolated from Small Mesenteric but not Cerebral Arteries after 3-Day Simulated Microgravity in Rats – 57

Yamada, Kyoji
Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana – 63

Yamaguchi, Kazuo
Effect of Hypergravity on Expression Levels of Lignin Biosynthesis-Related Genes in Arabidopsis Thaliana – 63

Yamamoto, Hiroshi
Role of Macrophage Function in Regeneration of Soleus Muscle Fibers in OP/OP Mice – 67

Role(s) of Macrophage in the Plasticity of Plantaris Muscle Fibers in OP/OP Mice – 73

Yamasaki, Masao
A Trial for Studying Effects of Gravity on the Fetus – 46

Immunohistochemical Analysis on Urinary System in Neonatal Rats after Spaceflight – 59

Yamashita, Masamichi
Auxin Polar Transport is Essentially Required for Graviresponse in Early Growth Stage of Etiolated Pea Seedlings – 52

Living in Greenhouse Built on Mars – 46

Yang, Changbin
Effects of Self-Generated Lower Body Negative Pressure Training on Cardiovascular Function and Lower Body Negative Pressure Tolerance – 73

YANG, Chun-xin
Study on Range of Motion of Manual Performance for Ergonomics Evaluation – 39

YANG, Feng
Study on Range of Motion of Manual Performance for Ergonomics Evaluation – 39

Yang, Run-nan
Study on Homogeneous Head Phantoms Based on Electrical Impedance Tomography – 39

YANG, Yong
Development of an Improved Ground-based Prototype of Space Plant-growing Facility – 40

Yang, Zhi
Effect of Simulated Weightlessness on the Expression of CBF 1 Induced by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 64

YANG, Zhi
Influence of Fluid Shear Stress on Expression of Cbf(alpha)1 in MG-63 Cells Cultured under Simulated Microgravity Condition – 41

Yao, Yong-Jie
Effects of Intermittent Head-Up Tilt on Endothelin Expression and Morphological Changes of Artery during Simulated Weightlessness in Rabbits – 69

Yao, Yongjie
Effects of Self-Generated Lower Body Negative Pressure Training on Cardiovascular Function and Lower Body Negative Pressure Tolerance – 73

Yarger, Cody B.
Multi-Functional Sandwich Composites for Spacecraft Applications: An Initial Assessment – 17

Yarlikova, Yu. V.
Investigation of the Fluidity and Permeability of Human Erythrocyte Plasma Membrane and the Efficacy of Oxygen Transfer by Hemoglobin during Rehabilitation Period after the Space Flight – 52

Yen, A.
The MER Mossbauer Spectrometers: 40 Months of Operation on the Martian Surface – 83

Yoshikawa, Fumihiko
A Trial for Studying Effects of Gravity on the Fetus – 46

Yoshimoto, Misa
Baroreflexes and Renal Function – 53

YOU, Fu-sheng
Electrical Impedance Imaging System for Intracranial Hemorrhage and its Preliminary Animal Experiment – 42

Study on Homogeneous Head Phantoms Based on Electrical Impedance Tomography – 39

Yu, Hongbin
Regional Comparison and Assimilation of GOCART and MODIS Aerosol Optical Depth across the Eastern U.S. – 30

Yu, Jirong
2.5 MHz Line-Width High-energy, 2 Micrometer Coherent Wind Lidar Transmitter – 26

Highly Efficient Q-switched Ho:YLF Laser Pumped by Tm:Fiber Laser – 26

Yu, Taran N.
The Effects of Clinorotation on the Process of Viral Infection in Potato Plants – 51

Yu, Zhi-Bin
Coordinated Switching of Myofilament Protein Isoforms via Gene Regulation and Alternative Splicing during Skeletal Muscle Adaptation – 58

YUAN, Xiu-gan
A Study of Pointing Movement Characteristics and Ergonomics on Front Board – 38

Study on Range of Motion of Manual Performance for Ergonomics Evaluation – 39

Yue-e WU
Non-rigid Medical Image Registration Based on the Thin-plate Spline and Shape Context – 39

Yun-feng CUI
Whole Body Simulation and Visualization of Metabolic Process of 18F 2-fluoro-2-deoxy-D-glucose – 41

Yusuf, R.
Analysis of Cell Proliferation in Newt (Pleurodeles waltl) Tissue Regeneration during Spaceflight in Foton M-2 – 57

Zakharov, I. S.
Structure and Function of the Snail Statocyst System after a 16-Day Flight on Foton-M-2 – 76

Zeredo, Jorge
Neuronal Activities in Rat Limbic System during Parabolic Flight – 63

Zhang HA
Non-rigid Medical Image Registration Based on the Thin-plate Spline and Shape Context – 39

Zhang, Li-Fan
Daily 1-H Standing Can Prevent Changes in Calcium Current of Vascular Myocytes Isolated from Small Mesenteric but not Cerebral Arteries after 3-Day Simulated Microgravity in Rats – 57

ZHANG, Lin
Study on Range of Motion of Manual Performance for Ergonomics Evaluation – 39

Zhang, Shao-wen
Spectral Analysis of Pulse Transit Time Variability – 42

Zhang, Shu
Changes of Mechanotransduction in MG-63 Osteosarcoma Cells Induced by Simulated Weightlessness – 64

Effect of Simulated Weightlessness on the Expression of CBF 1 Induced by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 64

Zhang, shu
Effects of Simulated Weightlessness on the Kinase Activity of MEK1 Induced by BMP-2 in Rat Osteosarcoma Cells – 47

Zhang, Shu
Effects of Simulated Weightlessness on the Kinase Activity of MEKl Induced by BMP-2 in Rat Osteosarcoma Cells – 70

ZHANG, Shu
Influence of Fluid Shear Stress on Expression of Cbf(alpha)1 in MG-63 Cells Cultured under Simulated Microgravity Condition – 41

Zhang, Ye
Expression of Genes Associated with DNA Damage Sensing in Human Fibroblasts Exposed to Low-dose-rate Gamma Rays – 35

ZHANG, Yong-hong
Design and Implementation of A Portable ECG Monitor for Multi-user – 40

ZHAO, Kang-han
Research Advancement of Superhydrophilic Thin Film in Condensation Heat Regenerators – 75

ZHAO, Lun
Early Face Processing of Internet Addiction Patients by Face-specific N170 – 39

Zheng, Xiao-xiang
Spectral Analysis of Pulse Transit Time Variability – 42

ZHOU Kang-yuan
Non-rigid Medical Image Registration Based on the Thin-plate Spline and Shape Context – 39

ZHOU Ping
Non-rigid Medical Image Registration Based on the Thin-plate Spline and Shape Context – 39

ZHU, Jing-tao
Development of an Improved Ground-based Prototype of Space Plant-growing Facility – 40

ZHU, Xing-hua
Realization of Anisotropic Bone Remodelling Process – 38

Zimmerli, Greg
Two-Photon Fluorescence Microscopy for Biomedical Research – 36

Zimmerli, Gregory A.
Propellant Gauging for Exploration – 82