NASA SP-7011 (421)
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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Introduction

This issue of *Aerospace Medicine and Biology, A Continuing Bibliography with Indexes* (NASA SP-7011) lists 37 reports, articles, and other documents recently announced in the NASA STI Database.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which humans are subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Applied research receives the most emphasis, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

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Includes human engineering; biotechnology; and space suits and protective clothing.

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Typical Report Citation and Abstract

ACCESSION NUMBER ↓

DOCUMENT ID NUMBER → **19960021053;** 96N24540 NASA Langley Research Center, Hampton, VA USA. ← CORPORATE SOURCE

TITLE → **An Extended Compact Tension Specimen for Fatigue Crack Propagation and Fracture**

AUTHORS → Piascik, R. S., NASA Langley Research Center, USA; Newman, J. C., Jr., NASA Langley Research Center, USA; ← AUTHORS' AFFILIATION

PUBLICATION DATE → Mar. 1996, pp. 16; In English

CONTRACTS/GRANTS → Contract(s)/Grant(s): RTOP 538–02–10–01

REPORT NO.(S) → Report No.(s): NASA–TM–110243; NAS 1.15:110243; No Copyright; Avail: CASI A03, Hardcopy; A01, Microfiche ← AVAILABILITY AND PRICE CODE

ABSTRACT → An extended compact tension specimen, EC(T) has been developed for fatigue and fracture testing. Documented herein are stress-intensity factor and compliance expressions for the EC(T) specimen.

ABSTRACT AUTHOR → Author

SUBJECT TERMS → *Crack Propagation; Stress Intensity Factors; Fatigue (Materials)*

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 421)

SEPTEMBER 3, 1996

51
LIFE SCIENCES (GENERAL)

19960026831; 96N28380 Materials Research Society, Pittsburgh, PA USA

Biomimetic Materials, Sensors and Systems, Volume C3, Special Issue: Papers Presented at Symposium S: Biomolecular and Biomimetic Materials MRS Fall Meeting

Rossi, D. D., Materials Research Society, USA; Calvert, P., Materials Research Society, USA; Tateishi, T., Materials Research Society, USA; Dec. 02, 1994; ISSN 0928-493199p; In English, 28 Nov. - 2 Dec. 1994, Boston, MA, USA; Sponsored by Materials Research Society, USA; Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

Contract(s)/Grant(s): N00014-95-I-0131

Report No.(s): AD-A302745; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

This journal is cited by the following Abstracting Services: Cambridge Scientific Abstracts; Chemical Engineering and Biotechnology Abstracts (online database); Current Biotechnology Abstracts; Engineered Materials Abstracts; Engineering Index; Fluid Abstracts; Fluidex; FIZ karlsruhe; Glass Technology Abstracts; INSPEC Information Services; Metals Abstracts; physics Database; Physics and Chemistry of Glasses; Surface Treatment Technology Abstracts. This issue contains a group of papers presented at the Fall 1994 Materials Research Society meeting in the Symposium on Biomolecular and Biomimetic Materials. For the last seven years the MRS has organized a symposium, which deals with the biology/materials interface, during the Boston meeting. This annual event is probably the best regular survey of the various fields which can be grouped under the 'Biomimetic' heading. The shift in emphasis each year also means that different areas come under the spotlight. In this last meeting there were particular emphases on membranes and interfaces and on applications of biological polymers.

DTIC

Data Bases; Information Systems; Biotechnology; Chemical Engineering

19960027434; 96N28826 Dynamac Corp., Cocoa Beach, FL USA

Seed-to-seed growth of superdwarf wheat and arabidopsis using red light-emitting diodes (LED's): A report on baseline tests conducted for NASA's proposed Plant Research Unit (PRU)

Goins, G. D., Dynamac Corp., USA; Yorio, N. C., Dynamac Corp., USA; Sanwo, M. M., Dynamac Corp., USA; Brown, C. S., Dynamac Corp., USA; Apr. 199656p; In English

Contract(s)/Grant(s): NAS10-12180

Report No.(s): NASA-TM-111678; NAS 1.15:111678; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

To determine the influence of narrow-spectrum red light-emitting diodes (LED's) on plant growth and seed production, wheat (Triticum aestivum L.cv Superdwarf) and Arabidopsis (Arabidopsis thaliana (L.) Heynh, race Columbia) plants were grown under red LED's (peak emission 660 nm) and compared to plants grown under daylight fluorescent (white) light and red LED's supplemented with either 1 percent or 10 percent blue fluorescent (BF) light. Wheat growth under red LED's alone appeared normal, whereas Arabidopsis under red LED's alone developed curled leaf margins and a spiraling growth pattern. Both wheat and Arabidopsis under red LED's alone or red LED's + 1 percent BF light had significantly lower seed yield than plants grown under white light. However, the addition of 10 percent BF light to red LED's partially alleviated the adverse effect of red LED's on yield. Irrespective of the light treatment, viable seeds were produced by wheat(75-92 percent germination rate) and Arabidopsis (85-100 percent germination rate). These results indicate that wheat, and to a lesser extent Arabidopsis, can be successfully grown under red LED's alone, but supplemental blue light is required with red LED's to sufficiently match the growth characteristics and seed yield associated with plants grown under white light.

Author

Plants (Botany); Light Emitting Diodes; Wheat; Crop Growth; Seeds; Visible Spectrum; Light Sources

19960028621; 96N29340 Baylor Coll. of Medicine, Houston, TX USA

Proceedings of the international conference on methods in protein structure analysis, *30 Sep. 1994-30 Dec. 199*

Atassi, M. Zouhair, Principal Investigator, Baylor Coll. of Medicine, USA; Appella, Ettore, National Cancer Inst., USA; Jan. 1996525p; In English; 10th, 8-13 Sep. 1994, Snowbird, UT, USA
Contract(s)/Grant(s): DAMD17-94-J-4003
Report No.(s): AD-A303739; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

Partial Contents: Protein and Peptide Preparation for Microsequence Analysis; N-Terminal Sequence Analysis; C-Terminal Sequence Analysis; Mass Spectrometry; New Strategies for Protein and Peptide Characterization; Immunological Recognition, Phage and Synthetic Libraries; Analysis of Protein Structures of Special Interest; Database Analysis, Protein Folding and Three-Dimensional Structures of Proteins.
DTIC
Proteins; Peptides; Conferences; Molecular Structure; Chemical Analysis

19960029881; 96A60704
Modeling and experimental analysis of multipatch planar applicators for microwave hyperthermia
Michel, C., Domaine Scientifique et Universitaire, France; Cresson, P.-Y.; Dubois, L.; Chive, M.; Pribetich, J.; Microwave and Optical Technology Letters; June 20 1996; ISSN 0895-2477; vol. 12, no. 3, pp. 123-128; In English; Copyright; Avail: Issuing Activity

This article describes a new type of external planar applicator with several patches. The new planar applicator has been developed for microwave hyperthermia controlled by microwave radiometry. The theoretical results, which are presented and verified by experimental measurements, clearly show that it is possible to obtain larger heating patterns with the multiple-patch planar applicator than with single-patch applicators.
Author (EI)
Computerized Simulation; Equations of Motion; Heating; Hyperthermia; Microwave Equipment; Microwave Radiometers; Radiometers; Therapy

19960030738; 96A61561
Molecular orbital model of the diatom frustule: potential for biomimetics
Lobel, K. D., Univ of Florida, USA; West, J. K.; Hench, L. L.; Journal of Materials Science Letters; April 15 1996; ISSN 0261-8028; vol. 15, no. 8, pp. 648-650; In English; Copyright; Avail: Issuing Activity

A theoretical model of organic-inorganic interface is developed. The model is used on 1) experimental compositional analysis of the organic phase, 2) molecular orbital modeling of an energetically-favorable reaction mechanism and 3) stereochemical relationships at the interface that may induce the nucleation of biogenic silica. Based on this model, it is believed there is significant potential for hydroxyl-rich beta -sheet proteins to induce the epitaxial nucleation of silica mechanism of biosilification within species that use silica, such as diatoms and radiolarians. It may also be possible to harness this processing method to create novel nanocomposites with unique properties.
Author (EI)
Biology; Composition (Property); Inorganic Compounds; Interfaces; Mathematical Models; Molecular Orbitals; Organic Compounds; Protozoa

19960031272; 96A62095
Optical properties of miniaturized endoscopes for ophthalmic use
Rol, Pascal O., Univ. Eye Clinic (Zurich), USA; Jenny, Reinhard; Beck, Dominik; Fankhauser, Franz; Niederer, Peter; Optical Engineering; July 1995; ISSN 0091-3286; vol. 34, no. 7, pp. 2070-2077; In English; Copyright; Avail: Issuing Activity

Endoscopes for use in ophthalmology can now be manufactured with overall intraocular diameters smaller than 0.89 mm. Endoscopes based on gradient-index lenses yield a higher resolution than those making use of ordered fiber bundles having the same diameter. Likewise, endoscopes with optical elements having a diameter of 0.50 mm yield a higher resolution than those with smaller diameter (0.35 mm). Thanks to the miniaturization, a working channel can also be integrated within the tube of the endoscope instead of being a part of the illumination bundle. This allows the design of new endoscopic devices including various surgical instruments. Preference is given to an endoscope with an integrated aspiration/irrigation system or with a fiber for laser therapy. The potential phototoxicity of these systems is briefly discussed.
Author (EI)
Manufacturing; Ophthalmology; Optical Fibers; Optical Properties

19960031273; 96A62096
Resolution of time-resolved breast transillumination: in vitro measurements compared with theoretical predictions
Haller, Emmanuel B., Univ. Muenster, Germany; Depeursinge, Christian D.; Genton, Claude; Optical Engineering; July 1995; ISSN 0091-3286; vol. 34, no. 7, pp. 2084-2091; In English; Copyright; Avail: Issuing Activity

The resolution of time-gated breast transillumination images has been investigated both theoretically and experimentally. The resolution limit is quantified as the size of the smallest object visible on an image (the image quality index), which depends on such image parameters as the transfer function, the contrast, and the noise. The smallest diameter of a detectable carcinoma located in the breast has been determined on the basis of Monte Carlo simulation results as well as in vitro time-of-flight measurements on breast samples.

The comparison of the Monte Carlo simulation of light propagation within biological tissues with the experimental data has been able to confirm the validity of the simulation. The simulation results, compared with measurements, suggest that the formation of time-resolved transillumination images of biological tissues can be adequately modeled in the near infrared. The enhancement of the transfer function by the introduction of time-gated detection is verified, and the limiting contribution of the noise at short integration times has been investigated. The estimated diameter of the smallest detectable sphere embedded on the front surface of a 20 mm thick breast slab is around 3 mm. Extrapolated for a full-size breast, the estimate is still better by a factor of 2 than the resolution of classical diaphanography, which is commonly taken to be worse than 20 mm.
Author (EI)
Image Resolution; Imaging Techniques; Mammary Glands; Medical Equipment; Monte Carlo Method; Tissues (Biology)

19960031286; 96A62109
Surface immobilization of biomolecules by light
Sigrist, Hans, Univ. of Bern, Switzerland; Collioud, Andre; Clemence, Jean-Francois; Gao, Hui; Luginbuehl, Reto; Saenger, Michael; Sundarababu, Gajendran; Optical Engineering; August 1995; ISSN 0091-3286; vol. 34, no. 8, pp. 2339-2348; In English; Copyright; Avail: Issuing Activity

Biomolecules performing specific biological functions on material surfaces are progressively employed in the development of miniaturized biologically based assays, biosensors, bioelectronic devices, and medical equipment. Device performance is improved with covalently immobilized bioconstituents. The unique advantages of using light-controlled reactions to achieve biomolecule immobilization on surfaces are addressed. On activation of introduced light-sensitive reagents, biomolecules are covalently linked to material surfaces. Procedures leading to light-dependent engineering of surfaces are exceptionally facile. Immobilization by light is compatible with biological functions, enabling surface patterning and molecular coating of materials. Current strategies and protocols are illustrated with selected examples of biomolecule photoimmobilization.
Author (EI)
Bioinstrumentation; Biotechnology; Immobilization; Molecules

19960031300; 96A62123
New type of manifestation of the Doppler effect: an application to blood and lymph flow measurements
Ul'yanov, Sergey S., Saratov State Univ., Russia; Optical Engineering; October 1995; ISSN 0091-3286; vol. 34, no. 10, pp. 2850-2855; In English; Copyright; Avail: Issuing Activity

Based on theoretical and experimental analyses, it is shown that the spectrum of intensity fluctuations contains a high-frequency peak in the absence of a subsidiary reference wave at nonsmall angles of speckle observation. This phenomenon, interpreted as a new type of manifestation of the Doppler effect, is usual only for the case of strongly focused coherent beam scattering. The possibilities for using the observed effect in the measurements of blood and lymph flows in narrow native capillaries are discussed. The traditional Doppler method using strongly focused Gaussian beam scattering is also considered. It is shown that the frequency position of the Doppler peak in the spectrum of intensity fluctuations is defined not only by the angle of speckle observation but also by the relation between the waist beam diameter and the average size of flow inhomogeneities. This result was experimentally verified. It is concluded that the Doppler method of blood flow measurement using strongly focused Gaussian beam diffraction should be revised.
Author (EI)
Blood; Doppler Effect; Fluid Flow

19960031409; 96A62232
Three-dimensional electrical impedance tomography
Metherall, P., Univ of Sheffield, UK; Barber, D. C.; Smallwood, R. H.; Brown, B. H.; Nature; April 11 1996; ISSN 0028-0836; vol. 380, no. 6574, pp. 509-512; In English; Copyright; Avail: Issuing Activity

The electrical resistivity of mammalian tissues varies widely and is correlated with physiological function. Electrical impedance tomography (EIT) can be used to probe such variations in vivo, and offers a non-invasive means of imaging the internal conductivity distribution of the human body. But the computational complexity of EIT has severe practical limitations, and previous work has been restricted to considering image reconstruction as an essentially two-dimensional problem. This simplification can limit significantly the imaging capabilities of EIT, as the electric currents used to determine the conductivity variations will not in general be confined to a two-dimensional plane. A few studies have attempted three-dimensional EIT image reconstruction, but have not yet succeeded in generating images of a quality suitable for clinical applications. Here we report the development of a three-dimensional EIT system with greatly improved imaging capabilities, which combines our 64-electrode data-collection apparatus with customized matrix inversion techniques. Our results demonstrate the practical potential of EIT for clinical applications, such as lung or brain imaging and diagnostic screening.
Author (EI)
Electrical Impedance; Electrical Resistivity; Human Body; Imaging Techniques; Medical Equipment; Medical Services; Tissues (Biology)

52
AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

19960026766; 96N28326 Carolinas Medical Center, Charlotte, NC USA

Cytokines and macrophage function in humans - role of stress *Final Report, May 1994 - May 1996*

Sonnenfeld, Gerald, Principal Investigator, Carolinas Medical Center, USA; 19968p; In English

Contract(s)/Grant(s): NAG9-728

Report No.(s): NASA-CR-201019; NAS 1.26:201019; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

We have begun this study to commence the determination of the role of mild chronic stress in the effects of space flight on macrophage/monocyte function, a component of the immune response. Medical students undergoing regular periods of stress and relaxation have been shown to be an excellent model for determining the effects of stress on immune responses. We have begun using this model using the macrophage/monocyte as model leukocyte. The monocyte/macrophage plays a central role in immunoregulation. The studies to be included in this three year project are the effects of stress on: (1) interactions of monocytes with microbes, (2) monocyte production of cytokines, (3) monocyte phagocytosis and activity, and (4) monocyte expression of cell surface antigens important in immune responses. Stress hormone levels will also be carried out to determine if there is a correlation between stress effects on immune responses and hormonal levels. Psychological testing to insure subjects are actually stressed or relaxed at the time of testing will also be carried out. The results obtained from the proposed studies should be comparable with space flight studies with whole animals and isolated cell cultures. When complete this study should allow the commencement of the establishment of the role of stress as one compartment of the induction of immune alterations by space flight.

Author

Macrophages; Immune Systems; Space Flight Stress; Hormones; Psychological Tests; Physiological Responses; Experiment Design

19960026778; 96N28335 Lawrence Livermore National Lab., Livermore, CA USA

Recommended launch-hold criteria for protecting public health from hydrogen chloride (HCl) gas produced by rocket exhaust

Daniels, J.I., Lawrence Livermore National Lab., USA; Baskett, R. L., Lawrence Livermore National Lab., USA; Nov. 199514p; In English; Joint Army-Navy-NASA-Air Force Safety and Environmental Protection Subcommittee Meeting, 5 - 8 Dec. 1995, Tampa, FL, USA

Contract(s)/Grant(s): W-7405-ENG-48

Report No.(s): UCRL-JC-122574; CONF-951262-4; DE96-007268; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Solid-fuel rocket motors used by the USA Air Force (USAF) to launch missiles and spacecraft can produce ambient-air concentrations of hydrogen chloride (HCl) gas. The HCl gas is a reaction product exhausted from the rocket motor during normal launch or emitted as a result of a catastrophic abort destroying the launch vehicle. Depending on the concentration in ambient air, the HCl gas can be irritating or toxic to humans. The diagnostic and complex-terrain wind field and particle dispersion model used by the Lawrence Livermore National Laboratory's (LLNL's) Atmospheric Release Advisory Capability (ARAC) Program was applied to the launch of a Peacekeeper missile from Vandenberg Air Force Base (VAFB) in California. Results from this deterministic model revealed that under specific meteorological conditions, cloud passage from normal-launch and catastropic-abort situations can yield measureable ground-level air concentrations of HCl where the general public is located. To protect public health in the event of such cloud passage, scientifically defensible, emergency ambient-air concentration limits for HCl were developed and recommended to the USAF for use as launch-hold criteria. Such launch-hold criteria are used to postpone a launch unless the forecasted meteorological conditions favor the prediction of safe ground-level concentrations of HCl for the general public. The recommended concentration limits are a 2 ppM 1-h time-weighted average (TWA) concentration constrained by a 1-min 10-ppM average concentration. This recommended criteria is supported by human dose-response information, including data for sensitive humans (e.g., asthmatics), and the dose response exhibited experimentally by animal models with respiratory physiology or responses considered similar to humans.

DOE

Public Health; Solid Propellant Rocket Engines; Toxicity; Rocket Exhaust; Launch Vehicles; Hydrogen Chlorides

19960027206; 96N28649 Naval Medical Research Inst., Bethesda, MD USA

Non-linear ascent profiles reduce the risk of decompression illness after deep no-stop dives

Broome, J. R., Naval Medical Research Inst., USA; Oct. 01, 199528p; In English

Contract(s)/Grant(s): DN Proj. M0099

Report No.(s): AD-A302468; NMRI-95-61; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The influence of no-stop ascent profile shape on decompression illness (DCI) risk after deep air and heliox dives was investigated using a swine model of neurological DCI. Following a simulated dive to 200 fsw for 24 min bottom time, while breathing air, pigs were decompressed over 10 min at either a linear 20 fsw/min, or on a non-linear fast-deep/slow-shallow profile. In the linear group, there were 11 cases of neurological DCI including 1 death and 8 cases with severe features,

compared to 5 neurological DCI cases (1 severe) in the fast/slow group. 13/20 of the linear group versus 6/20 had moderate or severe skin DCI affecting greater than 20% skin surface area. A similar study, but of paired, randomized, investigator-blind, sequential design was performed with pigs breathing 80/20% heliox. Pigs dived to 250 fsw for 8 min 50 s, then decompressed at either a linear 30 fsw/min rate, or on a fast/slow profile. Neurological DCI occurred significantly ($p = 0.024$) more frequently in the linear group (16/20; 1 death and 11 severe) than in the fast/slow group (8/20; 3 severe). Moderate or severe skin DCI affected 16 of the linear group compared to 3 of the fast/slow group ($p = 0.0002$). The study findings suggest that, for deep no-stop diving, a non-linear fast-deep/slow-shallow ascent profile is safer than a linear rate of ascent, irrespective of breathing gas. This finding has the potential to reduce the risk of both military and civil diving operations.
DTIC
Decompression Sickness; Diving (Underwater); Gas Mixtures; Helium-Oxygen Atmospheres; Neurology; Breathing Apparatus

19960027235; 96N28676 Defence and Civil Inst. of Environmental Medicine, Aerospace Physiology Group., Downsview, Ontario Canada
Cardiovascular Responses to Very Long Duration Positive Pressure Breathing ***Final Report, Jan. 1993 - Sep. 1994***
Fraser, W. D., Defence and Civil Inst. of Environmental Medicine, Canada; Ackles, K. N., Defence and Civil Inst. of Environmental Medicine, Canada; Mar. 199573p; In English
Report No.(s): AD-A302972; NAWCADWAR-95035-4.6; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This study was undertaken to examine the effectiveness of the US Navy Enhanced Anti-G Lower Ensemble (EAGLE) and the US Air Force Advanced Tactical Anti-G System (ATAGS) enhanced coverage G-suits in providing protection against the adverse effects of positive pressure breathing and to establish the physiological duration limits of high levels of PPB. Six experienced subjects, wearing ATAGS and EAGLE G-suits and counter pressure chest jerkins, were exposed to counterbalanced sessions of 60, 70, and 80 mmHG PPB for up to 20 minutes. They underwent an additional exposure at 70 mmHG PPB while wearing the Tactical Life Support System (TLSS) integrated G-suit and PPB jerkin. G-suit pressure was 4 times PPB jerkin and mask pressure. All six subjects completed 80 mmHG PPB. Five of the subjects completed the 60 mmHG session and four of the subjects completed the 70 and 80 mmHG PPB session with the EAGLE garment. There were small, but statistically significant differences, in the changes in heart rate, stroke volume, cardiac index, and mean arterial blood pressure among the three garments with the TLSS garment providing better overall cardiovascular support at 70 mmHG PPB. The ability of some subjects to tolerate 80 mmHG of PPB for up to 20 minutes without difficulty indicates that the duration limit for this type of PPB exposure, with respect to either cardiovascular collapse or discomfort, has yet to be established.
DTIC
Cardiovascular System; Life Support Systems; Pressure Suits; Pressure Breathing; Physiological Responses; Human Tolerances; Heart Function

19960027260; 96N28698 California Univ., Davis, CA USA
Genetic immunization for lentiviral immunodeficiency virus infection and disease ***Annual Report***
Gardner, Murray B., Principal Investigator, California Univ., USA; Malone, R. W., California Univ., USA; Torres, J. V., California Univ., USA; McChesney, M. B., California Univ., USA; Luciw, P. A., California Univ., USA; Rhodes, G. H., California Univ., USA; Ansari, A. A., California Univ., USA; Lee, K., California Univ., USA; Aug. 30, 199569p; In English
Contract(s)/Grant(s): DA MD17-94-J-4436
Report No.(s): AD-A302258; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

In year one of the current project, experiments have been performed to: (1) Examine the 'normal' progression of SIV infection and disease using standardized conditions and the various assays proposed for examination of animals receiving DNA vaccines (including virus load, cellular and humoral immune responses, and cytokine profiles). Standardization of our SIV macaque animal model system was performed in preparation for genetic immunization versus SIV immunization. Assays for viral load, antiviral and cellular immune responses and cytokine levels (to SIV and nonspecific antigens) were applied to four SIV infected and two uninfected rhesus macaques. Considerable innate individual animal variation was observed in immune responsiveness to SIV and other antigens, as was corresponding variation in ability to control SIV infection. Our laboratory assays also revealed, somewhat unexpectedly, problems which now largely been resolved; and (2) Develop novel expression vectors intended to improve levels of expression of SIV proteins from DNA injection in mice and primates. A number of novel expression vectors have been designed and tested in cell culture and in animals. These expression vector constructs were found to be very active relative to previously available constructions, and are now being adapted for the expression of a variety of SIV envelope proteins.
DTIC
Infectious Diseases; Viral Diseases; Viruses; Standardization; Deoxyribonucleic Acid; Cells (Biology); Assaying

19960027362; 96N28789 State Univ. of New York, Dept. of Physiology., Buffalo, NY USA
Cellular and Molecular Mechanisms of High Pressure Inotropy in Cardiac Muscle ***Final Report, 1 Aug. 1991 - 31 May 1995***

Hogan, Perry M., State Univ. of New York, USA; Besch, Stephen R., State Univ. of New York, USA; Dec. 04, 19955p; In English
Contract(s)/Grant(s): N00014-91-J-1842
Report No.(s): AD-A302891; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The objective of the project was to exploit isolated cardiac myocytes as a model system for investigating the effects of hydrostatic pressure on calcium regulated phenomena. This involved 5 specific aims: (1) to develop instrumentation to perform needed measurements of intracellular calcium transients at high hydrostatic pressure and with high time-resolution; and to determine (2) if pressure acts to change resting and/or dynamic cytosolic calcium in the mammalian cardiac myocyte, (3) the role of the sarcoplasmic reticulum in pressure induced inotropy, (4) the role of sodium-potassium pump inhibition in pressure induced inotropy, (5) the role of the sodium-calcium exchanger in pressure induced inotropy. Objective 1 was met with the development of the devices and techniques developed over the course of this project. Objective 2 was met with the initial design of the pressure chamber. Further refinements were required to meet the remaining objectives, which are currently being investigated.
DTIC
Cells (Biology); High Pressure; Heart; Calcium; Muscles; Pressure Effects

19960027465; 96N28853 NASA Langley Research Center, Hampton, VA USA
Calculation of dose, dose equivalent, and relative biological effectiveness for high charge and energy ion beams
Wilson, J. W., NASA Langley Research Center, USA; Chun, S. Y., Old Dominion Univ., USA; Reginatto, M., Department of Energy, USA; Hajnal, F., Department of Energy, USA; 1995; ISSN 0017-90788p; Repr. from Health Physics, v. 68, no. 4, Apr. 1995 p 532-538; In English
Report No.(s): NASA-TM-111556; NAS 1.15:111556; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

The Green's function for the transport of ions of high charge and energy is utilized with a nuclear fragmentation database to evaluate dose, dose equivalent, and RBE for C3H10T1/2 cell survival and neo-plastic transformation as function of depth in soft tissue. Such evaluations are useful to estimates of biological risk for high altitude aircraft, space operations, accelerator operations, and biomedical application.
Author
Relative Biological Effectiveness (Rbe); Biological Effects; Dosage; Ion Beams; Risk

19960029587; 96A60410
Method for noninvasive estimation of left ventricular end diastolic pressure based on analysis of heart wall vibration
Sato, M., Tohoku Univ, Japan; Kanai, H.; Chubachi, N.; Honda, H.; Koiwa, Y.; Electronics Letters; May 23 1996; ISSN 0013-5194; vol. 32, no. 11, pp. 949-950; In English; Copyright; Avail: Issuing Activity

The authors present a new noninvasive method for measurement of the left ventricular (LV) end diastolic pressure by combining Mirsky's method and the experimentally derived relationship among the elasticity of the LV wall, the LV sizes and the LV instantaneous mode-2 eigenfrequency. The LV instantaneous eigenfrequency is selectively determined from the time-frequency distribution obtained by applying the wavelet transform (WT) to the nonstationary vibration on the heart wall.
Author (EI)
Blood Vessels; Cardiology; Frequency Distribution; Pressure Measurement; Prosthetic Devices; Temporal Distribution; Wavelet Analysis

19960031747; 96A62570
AlGaN ultraviolet photoconductors grown on sapphire
Walker, D., Northwestern Univ, USA; Zhang, X.; Kung, P.; Saxler, A.; Javadpour, S.; Xu, J.; Razeghi, M.; Applied Physics Letters; April 8 1996; ISSN 0003-6951; vol. 68, no. 15, pp. 2100-2101; In English; Copyright; Avail: Issuing Activity

Metalorganic chemical vapor deposited AlGaN ultraviolet photodetectors with a cutoff wavelength down to 20 nm have been successfully demonstrated for the first time. The maximum responsivity is about A/W at room temperature. The carrier lifetime is derived from the voltage-dependent responsivity, which is in the range of 0.3-0.36 ms.
Author (EI)
Aluminum Compounds; Carrier Lifetime; Electron Mobility; Gallium Compounds; Gallium Nitrides; Metalorganic Chemical Vapor Deposition; Sapphire; Semiconductors (Materials); Sweep Effect

53
BEHAVIORAL SCIENCES

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

19960026835; 96N28384 Wright State Univ., Dept. of Psychology., Dayton, OH USA
Perception/Action: An Holistic Approach 2 ***Final Report, 15 Sep. 1992 - 14 Sep. 1995***
Flach, John M., Wright State Univ., USA; Nov. 199555p; In English
Contract(s)/Grant(s): F49620-92-J-0511; AF Proj. 2313
Report No.(s): AD-A302133; WSU-FR-662238; AFOSR-TR-95-0777; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This final report reviews three years of research focused on the coordination of perception and action. Human performance has been evaluated within the framework of a closed-

loop system where perception and action are intimately coupled. Four problems have been studied: the control of locomotion, dynamic occlusion, depth perception, and minimally invasive surgery. Studies of the control of locomotion have shown that for control of altitude there was an interaction between the flow structure (splay or depression angle) and the event dynamic (hover or forward flight). Results showed that in hover conditions, depression angle specifies altitude changes most reliably; but in forward flight conditions, splay angle specifies altitude changes most reliably. These results are explained as a function of signal-to-noise ratios within the optical flow field. Initial work to evaluate control of collision is also discussed. The dynamic occlusion task was used to evaluate effects of mode of observation (active versus passive) on performance. This task was chosen because of the ability to control for information differences. Results showed that the observation mode had little effect. Previous research that has shown an advantage for active observers appears to be due to information differences, not to the observation mode. Research on depth perception showed that difference that had previously been found for response mode (walking versus matching) could be attributed to the response frame (egocentric versus exocentric). Subjects were generally accurate (little effects due to foreshortening) when using an egocentric response frame. Finally, preliminary work to evaluate performance in minimally invasive surgery is outlined. This work included field observations of surgery as well as laboratory studies.
DTIC
Space Perception; Human Performance; Display Devices

19960027322; 96N28756 Armstrong Lab., Crew Systems Directorate; Human Engineering Division., Wright-Patterson AFB, OH USA
Choice bimanual aiming with unequal indices of difficulty
Waltensenperger, George M., Armstrong Lab., USA; Apr. 01, 1995256p; In English
Report No.(s): AD-A302446; AL/CF-TR-1995-0068; No Copyright; Avail: CASI; A12, Hardcopy; A03, Microfiche

Human performance response times are typically predicted using two models. Hick's Law, used to predict reaction time (RT), linearly relates RT to the information content of the stimulus. Fitts' Law linearly relates movement time (MT) to the difficulty (ID) of the particular task. Three studies were conducted to characterize temporal bimanual aiming performance. Pilot Study I verified Hick's and Fitts' Laws for unimanual tasks only. Pilot Study II established the validity of the stimulus-response board used as a testbed for bimanual tasks. The Main Study tested discrete, unimanual and bimanual visual aiming tasks. The number of target alternatives (N) varied to test Hick's Law. Task difficulty varied by changing movement amplitude and target width to test Fitts' Law. All task performance was affected by changing task difficulty of the opposite hand (OPID) for both the easy and difficult task hands. Both laws held under bimanual tasking with OPID held constant. RTand MT lengthened with increasing N, ID, and OPID. RT and MT were positively correlated for all bimanual tasks under all conditions. Results also showed little reaction and movement synchrony between hands. Multiple linear regression was used to examine RT, MT and total response time (TRT) bimanual models.
DTIC
Human Performance; Reaction Time; Visual Tasks; Task Complexity

19960027457; 96N28846 Naval Postgraduate School, Monterey, CA USA
Searching and Scanning: A Review of Lawrence W. Stark's Vision Models
Lind, Judith H., Naval Postgraduate School, USA; Dec. 199548p; In English
Report No.(s): AD-A302569; NPS-OR-95-014; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The primary goal of this study has been to assess the applicability of the theories to U.S. Army search and target acquisition problems, especially for modeling of visual search for various targets in cluttered terrain. The Stark model refers to search as a process involving active eye movements that cover a scene, with the goal of locating a specific kind of object, while scanning is systematic inspection of an object when it has been located, to compare its features with those of stored cognitive models and to complete the recognition and identification process. Simple algorithmic models have been proposed by Stark for both the search and the scanning processes, as discussed in this report. A comprehensive top level theoretical model of visual search has been developed, incorporating the simpler models, and a very elementary prototype computer program prepared. The research and models have been reviewed for this study and the useful and most promising components identified. Model discrepancies and omissions also are noted so efforts can be made to improve the model if desired and to increase its usefulness for U.S. Army modeling.
DTIC
Target Acquisition; Visual Perception; Cognition; Eye Movements

19960027458; 96N28847 Armstrong Lab., Wright-Patterson AFB, OH USA
Female Performance Under High-G during Fatigue and after G-Layoff ***Annual Report, 5 Dec. 1994 - 1 Aug. 1995***
Chelette, Tamara L., Armstrong Lab., USA; Sep. 01, 199513p; In English
Contract(s)/Grant(s): MIPR-95MM5549
Report No.(s): AD-A302660; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This document is an annual progress report covering the period 5 Dec 94 to 1 Aug. 95. The research effort includes the

study of human performance under sustained acceleration after fatigue (one night's sleep loss) and G-layoff of up to four weeks. Fifteen male and fifteen women are participating. Measures of performance include closed-loop flight of the Dynamic Environment Simulator up to 9 Gz, altitude awareness, auditory speech choice reaction time testing, and monitoring an instrument panel. Other relevant measures being performed include C adaptation response, anthropmetry, strength, and cardiac function.
DTIC
Human Performance; Feedback Control; Fatigue (Biology)

19960027459; 96N28848 Air Force Medical Center, Lackland AFB, TX USA
Predicting Military-Induced Stress Responses in Servicewomen (Air Force) ***Annual Report, 15 Nov. 1994 - 1 Aug. 1995***
Fiedler, Edna, Air Force Medical Center, USA; Sep. 19, 19957p; In English
Contract(s)/Grant(s): MIPR-95MM5511
Report No.(s): AD-A302668; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This study is to provide a description of medical, prior-to-service biographical data, and neuropsychological characteristics of women who enlist in the USA Air Force allowing comparison of women and men of different ethnic backgrounds who do or do not (a) excessively use medical resources, (b) successfully graduate. Subjects were about 1500 female and 800 male recruits entering USAF Basic Military Training (BMT) at Lackland AFB. Data collection included prior-to-service biographical data, scores on Micro-Cog, medical record data, and graduation/discharge data. Results are being analyzed using cross tabulations, MANOVAS, and regression analysis. Discussion will focus on gender and or ethnic comparisons, implications for recruit screening, and potential intervention strategies.
DTIC
Personnel Selection; Data Acquisition; Aircraft Pilots

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also 16 Space Transportation.

19960026832; 96N28381 Bolt, Beranek, and Newman, Inc., Cambridge, MA USA
Research, development, training, and evaluation (RDT&E) support: Operability model architecture ***Final Report, Mar. 1993 - Dec. 1994***
Deutsch, Stephen E., Bolt, Beranek, and Newman, Inc., USA; Cramer, Nichael L., Bolt, Beranek, and Newman, Inc., USA; Feehrer, Carl E., Bolt, Beranek, and Newman, Inc., USA; Deutsch, Stephen E., Bolt, Beranek, and Newman, Inc., USA; Jun. 01, 199581p; In English
Contract(s)/Grant(s): F33615-91-D-0009; AF Proj. 1710
Report No.(s): AD-A302260; AL/HR-TP-1995-0018; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The Operator Model Architecture (OMAR) project undertook the definition, implementation, test, and validation of an integrated suite of software tools to support the construction of Human Performance Process (HPP) models and the instantiation of the psychological framework previously developed by Bolt, Beranek, and Newman, Inc. (BBN). The project was undertaken in three phases. The objective of Phase 1 was to prepare a Software Functional Specification for the toolbox architecture. The Specification drew on analyses of requirements both to build and to support the testing of computational cognitive models, and on the anticipated requirement to operate within the OASYS simulation environment. During Phase 2, the software design and tools specified in Phase 1 were developed using a rapid prototying approach. Tests demonstrating the flinctionality of OMAR were conducted near the end of the phase, and an OMAR User's/Programmer's manual was written. In Phase 3, elements of the BBN psychological framework previously developed were instantiated with the aid of the OMAR tools developed in Phase 2, and an Air Traffic Control scenario identified during the earlier effort was used to test the resulting model.
DTIC
Software Engineering; Software Development Tools; Data Bases; Computer Systems Design; Computer Systems Programs; Computer Programs; Functional Design Specifications; Performance Prediction

19960027033; 96N28532 Hamilton Standard, Windsor Locks, CT USA
Advanced waste management technology evaluation ***Final Report***
Couch, H., Hamilton Standard, USA; Birbara, P., Hamilton Standard, USA; Jun. 27, 1996136p; In English
Contract(s)/Grant(s): NASw-5005
Report No.(s): NASA-CR-201083; NAS 1.26:201083; BD-96-04; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

The purpose of this program is to evaluate the feasibility of steam reforming spacecraft wastes into simple recyclable inorganic salts, carbon dioxide and water. Model waste compounds included cellulose, urea, methionine, Igapon TC-42, and high density polyethylenes. These are compounds found in urine, feces, hygiene water, etc. The gasification and steam reforming process used the addition of heat and low quantities of oxygen to oxidize and reduce the model compounds.The studied reactions were aimed at recovery of inorganic residues that can be recycled into a closed biologic system.

Results indicate that even at very low concentrations of oxygen (less than 3%) the formation of a carbonaceous residue was suppressed. The use of a nickel/cobalt reforming catalyst at reaction temperature of 1600 degrees yielded an efficient destruction of the organic effluents, including methane and ammonia. Additionally, the reforming process with nickel/cobalt catalyst diminished the noxious odors associated with butyric acid, methionine and plastics.
Author
Waste Treatment; Waste Disposal; Urine; Feces; Catalysts; Gasification

19960027224; 96N28665 Argonne National Lab., Reactor Engineering Div., IL USA
Multiresolution reproducing kernel particle methods in acoustic problems
Liu, W. K., Northwestern Univ., USA; Chang, C. T., Northwestern Univ., USA; Chen, Y., Northwestern Univ., USA; Uras, R. A., Argonne National Lab., USA; 199515p; In English; ASME Design Division Power Transmission and Gearing Conference, 17-20 Sep. 1995, Boston, MA, USA
Contract(s)/Grant(s): W-31109-eng-38
Report No.(s): ANL/RE/CP-87644; CONF-950929-1; DE96-004818; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In the analysis of complex phenomena of acoustic systems, the computational modeling requires special attention for a realistic representation of the physics. As a powerful tool, the finite element method has been widely used in the study of complex systems. In order to capture the important physical phenomena, p-finite elements and/or hp-finite elements are employed. The reproducing kernel particle methods (RKPM) are emerging as an effective alternative due to the elimination of a mesh, and the ability to analyze a specific frequency range. Additionally, a wavelet particle method based on the multiresolution analysis encountered in signal processing has been developed. The interpolation functions consist of spline functions with built-in window. A variation in the size of the window implies a geometrical refinement, and allows the filtering of the desired frequency range. Preliminary analysis of the wave equation shows the effectiveness of this approach. The frequency/wave number relationship of the continuum case can he closely simulated by using the reproducing kernel particle methods. A similar methodology is also developed for the Timoshenko beam.
DOE
Acoustic Simulation; Acoustic Measurement; Acoustics; Wavelet Analysis; Wave Equations; Finite Element Method

19960027227; 96N28668 Logicon Technical Services, Inc., Dayton, OH USA
The development of TRACE: An integrative bargaining paradigm for investigating multidisciplinary design tradeoffs ***Interim Report***
Brown, Clifford E., Wittenberg Univ., USA; McNeese, Michael D., Crew System Ergonomics Information Analysis Center, USA; Whitaker, Randall D., Logicon Technical Services, Inc., USA; Selvaraj, Jonathan, A., Logicon Technical Services, Inc., USA; Apr. 199539p; In English
Contract(s)/Grant(s): F41624-94-D-6000; AF Proj. 7184
Report No.(s): AD-A302387; AL/CF-TR-1995-0073; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report describes our creation, application, and validation testing of an experimental paradigm -- TRACE (Tradeoffs, Research, and Analysis in Collaborative Ergonomics). Our primary goal in developing TRACE was to craft a framework within which to experimentally probe issues relevant to negotiation and decision making in multidisciplinary design teams. The paradigm was adapted from ne gotiation research in the area of integrative (win-win) bargaining and was set in the context of an automobile navigation system development project. We hypothesized that if the paradigm reasonably captures the context of real-world multidisciplinary design practice, individuals with actual design experience would perform better than individuals with little or no design experience.
DTIC
Human Factors Engineering; Systems Engineering; Decision Making

19960027239; 96N28680 Defence and Civil Inst. of Environmental Medicine, Aerospace Physiology Group., Downsview, Ontario Canada
Cardiovascular Responses with TLSS, ATAGS, and Eagle Life Support Systems During Rapid Decompression ***Final Report, Jan. 1993 - Sep. 1994***
Fraser, W. D., Defence and Civil Inst. of Environmental Medicine, Canada; Ackles, K. N., Defence and Civil Inst. of Environmental Medicine, Canada; Mar. 199551p; In English
Report No.(s): AD-A302894; NAWCADWAR-95034-4.6; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This study compared the cardiovascular responses and degree of oxygen saturation of subjects exposed to 60,000 and 72,000 ft. rapid decompressions while wearing the U.S. Navy Enhanced Anti-G Lower Ensemble (EAGLE) and the U.S. Air Force Advanced Tactical Anti-G System (ATAGS) positive pressure breathing (PPB) ensembles. The subjects underwent the Tactical Life Support System (TLSS) integrated G-suit and PPB jerkin. Six subjects were rapidly decompressed from 22,500 to 60,000 ft. once with each of the ATAGS, EAGLE, and TLSS garments and from 35,000 ft. to 72,000 ft. once with the ATAGS and EAGLE garments. There were small but significant differences due to garment type on heart rate, stroke volume, cardiac index, and blood pressure, but all ensembles provided adequate protection against the adverse cardiovascular effects of PPB. Oxygen saturation was adequately maintained at 60,000 ft., with the TLSS garment

providing the highest level of oxygenation. At 72,000 ft. the oxygen saturations of subjects wearing the ATAGS fell so rapidly that they were unable to complete a two minute exposure to 72,000 ft. Oxygen saturations were maintained at an adequate level in five of the six subjects with the EAGLE system.
DTIC
Cardiovascular System; Physiological Responses; Life Support Systems; Pressure Breathing; Pressure Reduction; Physiological Tests

19960027248; 96N28688 Armstrong Lab., Brooks AFB, TX USA
Proceedings of a workshop on the life support and physiological issues of flight at 60,000 Feet and above: raising the operational ceiling ***Final Report***
Pilmanis, A. A., Editor, Armstrong Lab., USA; Sears, W. J., Editor, Armstrong Lab., USA; Dec. 1995393p; In English, 13 - 15 Jun. 1995, Brooks, TX, USA
Contract(s)/Grant(s): 7930; AF Proj.7930
Report No.(s): AD-A302855; AL/CF-SR-1995-0021; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

The altitude ceiling for selected high performance aircraft, e.g., the F-22 and Eurofighter 2000 has been raised from 50,000 to 60,000 feet. The impact of this change is complex and could impose decisive limitations with regard to crew safety issues. Detailed exposure limits, specifications and standards are required for the development of life support equipment, operational procedures, plans and training programs for exposure to these high altitude conditions. Developing these limits, specifications and standards requires a comprehensive research database for effective solutions. Over forty key individuals were brought together for a three day workshop at the Armstrong Laboratory, Brooks AFB, Texas on 13 to 15 June 1995, to discuss, coordinate and provide initial input for tracking life Support interrelationships which might have the potential to evolve into an operational limits database. The objectives of the workshop were to encourage direct discussion across disciplines by: (1) outlining the rationale for operating at higher altitudes as well as current life support equipment capabilities under development; (2) reviewing and integrating the physiological and life support requirements for increasing the operational altitude; (3) establishing limitations, additional research and equipment requirements and trade studies; and (4) providing a timely publication covering relevant issues to prevent crew safety from becoming a limiting factor in future high altitude operations.
DTIC
Life Support Systems; Supersonic Aircraft; Fighter Aircraft; Flight Crews; Aircraft Safety; High Altitude; Conferences

19960027254; 96N28692 Army Research Lab., Aberdeen Proving Ground, MD USA
The effect of vehicle noise and vibration (caused by moving operations) on cognitive performance in the command and control vehicle ***Final Report***
Tauson, Richard A., Army Research Lab., USA; Doss, N. W., Army Research Lab., USA; Rice, Debra J., Army Research Lab., USA; Tyrol, Douglas E., Army Research Lab., USA; Davidson, Donald, Army Research Lab., USA; Oct. 199556p; In English
Contract(s)/Grant(s): DA Proj. 1L162716AH70
Report No.(s): AD-A302381; ARL-MR-279; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

To maintain the pace of modern battle and to support the fielding of digital command and control systems, the U.S. Army needed to develop a new command and control vehicle (C2V). As part of an evaluation of human performance on automated command and control tasks in the C2V, this study attempted to quantify the effect of vehicle movement on computer operators. Fourteen subjects, who had computer and tracked vehicle experience, completed a subset of the Expanded Complex Cognitive Assessment Battery (CCAB) running on U.S. Army tactical command and control system (ATCCS) common hardware in the C2V. The tests were performed in stationary, vehicle idle, road march (secondary road at 20 mph), and cross-country (sandy river bed at 10 mph) conditions. Subjects were exposed to each condition for 30 minutes in the morning and again in the afternoon. After each condition, subjects completed questionnaires about human-machine interface and subjective discomfort. Subjects also completed a stress assessment questionnaire at the beginning of the test, after each cross-country trial, and at the end of the day. Although some subjects experienced discomfort and one was completely incapacitated by motion sickness, vehicle movement did not degrade cognitive performance of most of the test measures. In all cases, subjects were able to operate the computer in all vehicle movement conditions. The questionnaires and stress measurements showed a small effect from vehicle movement. An analysis of variance of the CCAB scores showed a significant degradation in performance for one subtest when idle and road march conditions were compared. The overall conclusion was that, at the speeds tested, the subjects were able to compensate for any stressors caused by vehicle movement.
DTIC
Digital Command Systems; Man Machine Systems; Human Performance; Tracked Vehicles; Operators (Personnel); Command and Control

19960027257; 96N28695 Massachusetts Inst. of Tech., Cambridge, MA USA
Human factors in tele-inspection and tele-surgery ***Annual Report, 9 Sep. 1994 - 8 Oct. 1995***
Sheridan, Thomas B., Principal Investigator, Massachusetts

Inst. of Tech., USA; Thompson, James, Massachusetts Inst. of Tech., USA; Jianjuen, Hu, Massachusetts Inst. of Tech., USA; Ottensmeyer, Mark, Massachusetts Inst. of Tech., USA; Ren, Jie, Massachusetts Inst. of Tech., USA; Oct. 09, 199553p; In English; Original contains color plates
Contract(s)/Grant(s): DA MD17-94-C-4125
Report No.(s): AD-A302239; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

In telesurgery a physician operates on a remote patient through a two-way communication and telerobot link. This first-year progress report describes development of a telesurgical simulator with force reflection and time delay, simulating what occurs with satellite communication. Also developed was a remotely controlled endoscopic tool. Using the simulator, preliminary experiments have been conducted with human subjects to evaluate alternative means to stabilize control movements under time delay, including a new technique combining 'sliding' control with 'fuzzy' control logic. Other experiments were conducted on 'cooperative' manipulation where remote telemanipulation is combined with manipulation by a human assistant working local to the patient. Included with the latter are developments of computer graphical aids for communication between surgeon and assistant. Planned future experiments are described for both delay compensation and cooperative manipulation.
DTIC
Satellite Communication; Teleoperators; Surgery; Time Lag; Communication Networks; Fuzzy Systems; Computerized Simulation; Human Factors Engineering

19960027460; 96N28849 Coast Guard Research and Development Center, Groton, CT USA
Evaluation of Night Vision Goggles (NVG)/Laser Illuminator for Maritime Search and Rescue ***Final Report, 17 Oct. - 4 Nov. 1994***
McClay, T. E., Coast Guard Research and Development Center, USA; Robe, R. Q., Coast Guard Research and Development Center, USA; Raunig, D. L., Analysis and Technology, Inc., USA; Marsee, R. L., Analysis and Technology, Inc., USA; May 199589p; In English
Contract(s)/Grant(s): DTCG39-89-C-E10G56
Report No.(s): AD-A302688; USCG-D-36-95; CGR-RDC-11/95; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

During the period 17 October to 04 November 1994, an experiment was conducted by the U.S. Coast Guard Research and Development (R&D) Center to evaluate the effectiveness of a laser illuminator when conducting nighttime searches using night vision goggles (NVGs) onboard HH-60J helicopters. Two helicopters were used to search for 18- and 21-foot small boats, 6- and 10-person life rafts, and simulated persons-in-the-water (PIWs). One of the HH-60J helicopters was fitted with laser illuminator; the other helicopter was used as the experimental control and did not have a illuminator. Both helicopter crews used NVGs. A total of 202 target detection opportunities were generated for laser illuminated targets (all types) and 620 target detection opportunities for nonlaser-illuminated targets. These two data sets were analyzed to determine if the use of an active illumination device with NVGs exerted a statistically significant influence on target detection probability. Lateral range curves and preliminary sweep width estimates are presented, for evaluation purposes only, when the data were sufficient to support the analysis Human factors data are also presented and discussed. The laser illuminator is very effective in enhancing detection capability of the NVGs for small search and rescue targets. The laser provides the greatest advantage in low ambient light conditions and against targets outfitted with retroreflective tape.
DTIC
Night Vision; Target Acquisition; Laser Targets

19960027884; 96N29026 NASA Johnson Space Center, Flight Crew Support Div., Houston, TX USA
Comparison of Extravehicular Mobility Unit (EMU) suited and unsuited isolated joint strength measurements
Maida, James C., NASA Johnson Space Center, USA; Demel, Kenneth J., NASA Johnson Space Center, USA; Morgan, David A., Lockheed Martin Engineering and Sciences Co., USA; Wilmington, Robert P., Lockheed Martin Engineering and Sciences Co., USA; Pandya, Abhilash K., Lockheed Martin Engineering and Sciences Co., USA; Jun. 199662p; In English
Contract(s)/Grant(s): NAS9-18800
Report No.(s): NASA-TP-3613; NAS 1.60:3613; S-809; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

In this study the strength of subjects suited in extravehicular mobility units (EMU's) - or Space Shuttle suits - was compared to the strength of unsuited subjects. The authors devised a systematic and complete data set that characterizes isolated joint torques for all major joints of EMU-suited subjects. Six joint motions were included in the data set. The joint conditions of six subjects were compared to increase our understanding of the strength capabilities of suited subjects. Data were gathered on suited and unsuited subjects. Suited subjects wore Class 3 or Class 1 suits, with and without thermal micrometeoroid garments (TMG's). Suited and unsuited conditions for each joint motion were compared. From this the authors found, for example, that shoulder abduction suited conditions differ from each other and from the unsuited condition. A second-order polynomial regression model was also provided. This model, which allows the prediction of suited strength when given unsuited strength information, relates the torques of unsuited conditions to the torques of all suited conditions. Data obtained will enable computer modeling of EMU strength, conversion from unsuited to suited data, and isolated joint strength comparisons between suited and unsuited conditions at any measured angle. From these data mission planners and human factors engineers may gain a better understanding

of crew posture, and mobility and strength capabilities. This study also may help suit designers optimize suit strength, and provide a foundation for EMU strength modeling systems.
Author
Extravehicular Mobility Units; Human Factors Engineering; Mobility; Strength

19960027896; 96N29038 Life Systems, Inc., Cleveland, OH USA
Electrolysis Performance Improvement Concept Study (EPICS) flight experiment phase C/D *Final Report*
Schubert, F. H., Life Systems, Inc., USA; Lee, M. G., Life Systems, Inc., USA; Nov. 28, 199588p; In English
Contract(s)/Grant(s): NAS9-18568
Report No.(s): NASA-CR-199855; NAS 1.26:199855; TR-1415-36; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The overall purpose of the Electrolysis Performance Improvement Concept Study flight experiment is to demonstrate and validate in a microgravity environment the Static Feed Electrolyzer concept as well as investigate the effect of microgravity on water electrolysis performance. The scope of the experiment includes variations in microstructural characteristics of electrodes and current densities in a static feed electrolysis cell configuration. The results of the flight experiment will be used to improve efficiency of the static feed electrolysis process and other electrochemical regenerative life support processes by reducing power and expanding the operational range. Specific technologies that will benefit include water electrolysis for propulsion, energy storage, life support, extravehicular activity, in-space manufacturing and in-space science in addition to other electrochemical regenerative life support technologies such as electrochemical carbon dioxide and oxygen separation, electrochemical oxygen compression and water vapor electrolysis. The Electrolysis Performance Improvement Concept Study flight experiment design incorporates two primary hardware assemblies: the Mechanical/Electrochemical Assembly and the Control/Monitor Instrumentation. The Mechanical/Electrochemical Assembly contains three separate integrated electrolysis cells along with supporting pressure and temperature control components. The Control/Monitor Instrumentation controls the operation of the experiment via the Mechanical/Electrochemical Assembly components and provides for monitoring and control of critical parameters and storage of experimental data.
Derived from text
Electrolysis; Microgravity; Gravitational Effects; Spaceborne Experiments

19960028161; 96N29219 NASA Marshall Space Flight Center, Huntsville, AL USA
Human factors issues and approaches in the spatial layout of a space station control room, including the use of virtual reality as a design analysis tool
Hale, Joseph P., II, NASA Marshall Space Flight Center, USA; (1994)4p; In English; AIAA Space Programs and Technologies Conference, 26-28 Sep. 1995, Huntsville, AL, USA
Report No.(s): NASA-TM-111445; NAS 1.15:111445; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Human Factors Engineering support was provided for the 30% design review of the late Space Station Freedom Payload Control Area (PCA). The PCA was to be the payload operations control room, analogous to the Spacelab Payload Operations Control Center (POCC). This effort began with a systematic collection and refinement of the relevant requirements driving the spatial layout of the consoles and PCA. This information was used as input for specialized human factors analytical tools and techniques in the design and design analysis activities. Design concepts and configuration options were developed and reviewed using sketches, 2-D Computer-Aided Design (CAD) drawings, and immersive Virtual Reality (VR) mockups.
Author
Human Factors Engineering; Integrated Mission Control Center; Space Station Freedom; Virtual Reality; Payload Control; Consoles

19960028552; 96N29279 Sandia National Labs., Albuquerque, NM USA
Collaborating with human factors when designing an electronic textbook
Ratner, J. A., Sandia National Labs., USA; Zadocks, R. I., Sandia National Labs., USA; Attaway, S. W., Sandia National Labs., USA; 199611p; In English; Leading Edge Training Technologies Conference, 19-20 Mar. 1996, Victoria, Canada
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Report No.(s): SAND-96-0952C; CONF-9603147-1; DE96-009173; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

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(201) 733–7782 Fax: (201) 733–5648

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General Library
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Albuquerque, NM 87131–1466
(505) 277–5441 Fax: (505) 277–6019

NEW MEXICO STATE LIBRARY
325 Don Gaspar Avenue
Santa Fe, NM 87503
(505) 827–3824 Fax: (505) 827–3888

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Cultural Education Center
Documents/Gift & Exchange Section
Empire State Plaza
Albany, NY 12230–0001
(518) 474–5355 Fax: (518) 474–5786

NORTH CAROLINA
UNIV. OF NORTH CAROLINA – CHAPEL HILL
Walter Royal Davis Library
CB 3912, Reference Dept.
Chapel Hill, NC 27514–8890
(919) 962–1151 Fax: (919) 962–4451

NORTH DAKOTA
NORTH DAKOTA STATE UNIV. LIB.
Documents
P.O. Box 5599
Fargo, ND 58105–5599
(701) 237–8886 Fax: (701) 237–7138

UNIV. OF NORTH DAKOTA
Chester Fritz Library
University Station
P.O. Box 9000 – Centennial and University Avenue
Grand Forks, ND 58202–9000
(701) 777–4632 Fax: (701) 777–3319

OHIO
STATE LIBRARY OF OHIO
Documents Dept.
65 South Front Street
Columbus, OH 43215–4163
(614) 644–7051 Fax: (614) 752–9178

OKLAHOMA
OKLAHOMA DEPT. OF LIBRARIES
U.S. Govt. Information Division
200 Northeast 18th Street
Oklahoma City, OK 73105–3298
(405) 521–2502, ext. 253
Fax: (405) 525–7804

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Edmon Low Library
Stillwater, OK 74078–0375
(405) 744–6546 Fax: (405) 744–5183

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PORTLAND STATE UNIV.
Branford P. Millar Library
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Portland, OR 97207–1151
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CLEMSON UNIV.
Robert Muldrow Cooper Library
Public Documents Unit
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Clemson, SC 29634–3001
(803) 656–5174 Fax: (803) 656–3025

UNIV. OF SOUTH CAROLINA
Thomas Cooper Library
Green and Sumter Streets
Columbia, SC 29208
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UNIV. OF MEMPHIS LIBRARIES
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Memphis, TN 38152–0001
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TEXAS STATE LIBRARY
United States Documents
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Austin, TX 78701–0001
(512) 463–5455 Fax: (512) 463–5436

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Documents Dept.
Lubbock, TX 79409–0002
(806) 742–2282 Fax: (806) 742–1920

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UTAH STATE UNIV.
Merrill Library Documents Dept.
Logan, UT 84322–3000
(801) 797–2678 Fax: (801) 797–2677

VIRGINIA
UNIV. OF VIRGINIA
Alderman Library
Govt. Documents
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(804) 824–3133 Fax: (804) 924–4337

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WASHINGTON STATE LIBRARY
Govt. Publications
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Olympia, WA 98504–2478
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Govt. Documents Section
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Morgantown, WV 26506–6069
(304) 293–3051 Fax: (304) 293–6638

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ST. HIST. SOC. OF WISCONSIN LIBRARY
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Madison, WI 53706
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