

NASA SP-7011 (411)
February 1996



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 54 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.

Each entry in the publication consists of a standard bibliographic citation accompanied, in most cases, by an abstract.

Two indexes—subject and author are included.

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Selecting an index above will link you to that comprehensive listing.

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Select **Appendix** for important information about NASA Scientific and Technical Information (STI) Office products and services, including registration with the NASA Center for AeroSpace Information (CASI) for access to the NASA CASI TRS (Technical Report Server), and availability and pricing information for cited documents.

Typical Report Citation and Abstract

ON MICROFICHE

- ↓
- ACCESSION NUMBER** → N96-10751# Sandia National Labs., Albuquerque, NM. ← **CORPORATE SOURCE**
- TITLE** → **Minimizing phylogenetic number to find good evolutionary trees**
- AUTHORS** → Goldberg, Leslie Ann; Goldberg, Paul W.; Phillips, Cynthia A.; Sweedyk, Elizabeth (California Univ., Berkeley, CA.); and Warnow, Tandy (Pennsylvania Univ., Philadelphia, PA.) ← **AUTHORS' AFFILIATION**
- PUBLICATION DATE** → 1995 26 p Presented at the 1995 Symposium on Combinatorial Pattern Matching, Helsinki, Finland, 4-7 Jul. 1995 Sponsored by California Legislative Grant
- CONTRACTS/GRANTS** → Contract(s)/Grant(s): (DE-AC04-94AL-85000; NSF CCR-94-57800)
- REPORT NO.(S)** → Report No.(s): (DE95-011893; SAND-95-0831C; CONF-9507123-1) Avail: CASI HC A03/MF A01 ← **AVAILABILITY AND PRICE CODE**
- ABSTRACT** → Inferring phylogenetic trees is a fundamental problem in computational-biology. We present a new objective criterion, the phylogenetic number, for evaluating evolutionary trees for species defined by biomolecular sequences or other qualitative characters. The phylogenetic number of a tree T is the maximum number of times that any given character state arises in T. By contrast, the classical parsimony criterion measures the total number of times that different character states arise in T. We consider the following related problems: finding the tree with minimum phylogenetic number, and computing the phylogenetic number of a given topology in which only the leaves are labeled by species. When the number of states is bounded (as is the case for biomolecular sequence characters), we can solve the second problem in polynomial time. We can also compute a fixed-topology 2-phylogeny (when one exists) for an arbitrary number of states. This algorithm can be used to further distinguish trees that are equal under parsimony. We also consider a number of other related problems.
- SUBJECT TERMS** → *DOE Algorithms; Biological Evolution; Chemical Evolution; Genetics; Molecular Biology*

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 411)

FEBRUARY 1996

51 LIFE SCIENCES (GENERAL)



N96-12135# National Renewable Energy Lab., Golden, CO.

Intermediate-scale high-solids anaerobic digestion system operational development

Rivard, C. J.; Feb. 1995 34 p

Contract(s)/Grant(s): (DE-FG44-91R4-10591)

Report No.(s): (DE95-009646; DOE/R4-10591/1) Avail: CASI HC A03/MF A01

Anaerobic bioconversion of solid organic wastes represents a disposal option in which two useful products may be produced, including a medium Btu fuel gas (biogas) and a compost-quality organic residue. The application of high-solids technology may offer several advantages over conventional low-solids digester technology. Operation of the anaerobic digestion process at high solids reduces the level of process water and thereby the size and capital costs for the digester system. In addition, by virtue of the lack of available water, the microbial catalysts are more productive in feedstock polymer hydrolysis. The National Renewable Energy Laboratory (NREL) has developed a unique digester system capable of uniformly mixing high-solids materials at low cost. Information gained from laboratory-scale digester research was used to develop the intermediate-scale digester system. This system represents a 50-fold scale-up of the original digester system and includes continuous feed addition and computer monitoring and control. During the first 1.15 years of operation, a variety of modifications and improvements were instituted to increase the safety, reliability, and performance of the system. Those improvements -- which may be critical in further scale-up efforts using the NREL high-solids digester design -- are detailed in this report.

DOE

Anaerobes; Bioconversion; Bioreactors; Organic Wastes (fuel Conversion); Performance Tests; Solid Wastes; Solids;

N96-12192# South Carolina Univ., Columbia, SC.

Characterization of the mammalian DNA polymerase gene(s) and enzyme(s) Annual Progress Report

Mishra, N. C.; Jan. 1995 5 p

Contract(s)/Grant(s): (DE-FG09-90ER-61040)

Report No.(s): (DE95-016135; DOE/ER-61040/4) Avail: CASI HC A01/MF A01

Two Genes for DNA polymerase delta were identified from the wild type Chinese hamster ovary cells. These genes were cloned via RT-PCR from mRNA prepared from the Chinese hamster ovary cells using primers specific to conserved sequences of the DNA polymerase delta gene. The first gene encodes a PCNA dependent DNA polymerase delta gene whereas the second gene encodes a PCNA independent DNA polymerase delta gene. Methods were developed to clone these genes in expression vector and host systems. The role of the two genes in DNA replication and repair was determined.

DOE

Cells (biology); Deoxyribonucleic Acid; Enzymes; Genes;

N96-12194 Department of Energy, Washington, DC.

Photosynthesis, environmental change, and plant adaptation: Research topics in plant molecular ecology

Jul. 1995 37 p Presented at the Photosynthesis, Environmental Change, and Plant Adaptation Workshop: Research Topics in Plant Molecular Ecology, Elkridge, MD, 24-26 Oct. 1993 Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

Report No.(s): (DE95-016191; DOE/NBB-0093; TR-056; CONF-9310436-SUMM) Avail: CASI HC A03

As we approach the 21st Century, it is becoming increasingly clear that human activities, primarily related to energy extraction and use, will lead to marked environmental changes at the local, regional, and global levels. The realized and the potential photosynthetic performance of plants is determined by a combination of intrinsic genetic information and extrinsic environmental factors, especially climate. It is essential that the effects of environmental changes on the photosynthetic competence of individual species, communities, and ecosystems be accurately assessed. On 24-26 Oct. 1993, a group of scientists specializing in various aspects of plant science met to discuss how our predictive capabilities could be improved by developing a more rational, mechanis-

tic approach to relating photosynthetic processes to environmental factors. A consensus emerged that achieving this goal requires multidisciplinary research efforts that combine tools and techniques of genetics, molecular biology, biophysics, biochemistry, and physiology to understand the principles, mechanisms, and limitations of evolutionary adaptation and physiological acclimation of photosynthetic processes. Many of these basic tools and techniques, often developed in other fields of science, already are available but have not been applied in a coherent, coordinated fashion to ecological research. The efforts of this research program are related to the broader efforts to develop more realistic prognostic models to forecast climate change that include photosynthetic responses and feedbacks at the regional and ecosystem levels.

DOE

Biological Effects; Climate Change; Ecology; Ecosystems; Photosynthesis; Plants (botany);

N96-12233* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

Active synthetic soil Patent

Ming, Douglas W.; inventor. Henninger, Donald L.; inventor. Allen, Earl R.; inventor. and Golden, Dadigamuwage C.; inventor. 19 Sep. 1995 13 p Filed 2 May 1994 Continuation of abandoned US-Patent-Appl-SN-963349, filed 16 Oct. 1992

Report No.(s): (NASA-CASE-MSC-21954-2; US-PATENT-CLASS-71-36; US-PATENT-CLASS-71-51; US-PATENT-CLASS-71-53; US-PATENT-CLASS-71-61; US-PATENT-CLASS-71-63; US-PATENT-CLASS-71-64.11; US-PATENT-CLASS-71-903; US-PATENT-CLASS-71-904; US-PATENT-APPL-SN-243336) Avail: US Patent and Trademark Office

A synthetic soil/fertilizer for horticultural application having all the agronutrients essential for plant growth is disclosed. The soil comprises a synthetic apatite fertilizer having sulfur, magnesium, and micronutrients dispersed in a calcium phosphate matrix, a zeolite cation exchange medium saturated with a charge of potassium and nitrogen cations, and an optional pH buffer. Moisture dissolves the apatite and mobilizes the nutrient elements from the apatite matrix and the zeolite charge sites.

Official Gazette of the U.S. Patent and Trademark Office
Calcium Phosphates; Fertilizers; Soils; Vegetation Growth; Zeolites;

N96-12701# Analytic Sciences Corp., San Antonio, TX.

Laser-induced acoustic and shock waves in ocular tissues Final Report

Oraevsky, Alexander A.; May 1995 37 p

Contract(s)/Grant(s): (F33615-92-C-0017)

Report No.(s): (AD-A294575; AL/OE-TR-1995-0044)

Avail: CASI HC A03/MF A01

Analytical expressions that describe the generation and propagation of acoustic and shock waves in biological tissues are presented. Several practical situations of laser irradiation of various ocular tissues have been considered and these include thermoelastic generation of acoustic waves, linear and nonlinear effects that occur upon propagation of stress transients in tissues, cylindrical shock wave generation upon plasma optical breakdown in the caustic of a focused laser beam, and spherical shock wave generation upon thermal explosion of melanosomes. The transformation of light energy into heat and then to mechanical stress is analyzed for ultrashort-pulse laser irradiation of absorbing tissues, and thermo-optical generation of high-amplitude acoustic waves and the formation of shock waves are reviewed. Stress wave alteration upon propagation through various media is considered along with acoustic wave reflection from boundaries and acoustic wave transmission through interfaces. Finally, nonlinear propagation of high-amplitude acoustic waves is covered.

DTIC

Irradiation; Laser Outputs; Shock Wave Propagation; Shock Waves; Sound Transmission; Sound Waves; Tissues (biology); Wave Generation;

N96-12702# Naval Health Research Center, San Diego, CA.

Sleep management manual Interim Report, Oct. 1993 - Dec. 1994

Kelly, Tamsin L.; Rosekind, Mark R.; and Naitoh, Paul; Dec. 1994 29 p

Report No.(s): (AD-A294586; NHRC-TD-94-5E) Avail: CASI HC A03/MF A01

Sleep is an essential physical need, like food, air, and water. You can skimp on it only to a point and still function. You will only perform and feel your best if you get an optimum amount of sleep. When operational requirements make this impossible, it is critical that you obtain the maximum amount of sleep possible within operational limitations. Also, it is important that you know the effects of sleep deprivation so that countermeasures can be used to compensate. The purpose of this manual is to provide naval personnel with the basic facts about sleep and to teach them specific sleep management techniques.

DTIC

Human Performance; Manual; Physiological Effects; Sleep; Sleep Deprivation; Work-rest Cycle;

N96-12747# Yale Univ., New Haven, CT.

Rotational resonance NMR structural studies of the neu receptor transmembrane domain Annual Report, 23 May 1994 - 23 May 1995

Smith, Steven O.; 23 May 1995 13 p

Contract(s)/Grant(s): (DAMD17-94-J-4048)

Report No.(s): (AD-A295872) Avail: CASI HC A03/MF A01

In order to determine the structure of the transmembrane domain of the neu/erbB-2 receptor and address the molecular mechanism of receptor activation by the transforming V(664) to E(664) mutation, magic angle spinning NMR and polarized Fourier transform infrared studies have been undertaken. These studies show that the region C-terminal to position 664 is helical and oriented roughly perpendicular to the membrane plane. When the E(664) carboxyl group is deprotonated, the region N-terminal to position 664 unfolds and the COO-group is exposed to the polar membrane interface. Protonation allows the peptide to adopt a helical conformation oriented perpendicular to the membrane plane. The pKa of the E(664) side chain is shifted by the membrane surface charge. Under conditions approximating those in native membranes, the carboxyl group readily partitions into the membrane. The high pKa observed for the E664 carboxyl group and increased orientation in DMPC:DMPS membranes argues that the V(664) to E(664) mutation causes the transmembrane domain to dimerize.

DTIC

Membranes; Mutations; Nuclear Magnetic Resonance; Receptors (physiology); Sense Organs;

N96-12751 Defence Science and Technology Organisation, Melbourne (Australia). Ship Structures and Materials Div.

Catalogue of the Australian National Collection of Biodeterioration Microfungi

Upsher, F. John; and Upsher, Corinne M.; 1 Jul. 1995 50 p
Report No.(s): (NIPS-95-05470; DSTO-GD-0054; AR-009-265) Copyright Avail: Issuing Activity (DSTO Aeronautical and Maritime Research Lab., PO Box 4331, Melbourne, Victoria 3001, Australia)

The Australian National Collection of Biodeterioration Microfungi is held at DSTO-AMRL, Maribyrnong, Vic. For over fifty years, it has been the repository for microfungi from diverse sources, mainly from materials and equipment. It is now a resource for taxonomic and physiological assessment, potential tools in biotechnology and for testing purposes. This is the first published catalogue of the collection.

CASI

Australia; Biodegradation; Botany; Catalogs (publications); Fungi; Microorganisms; Microspores;

N96-12829 Massachusetts Inst. of Tech., Cambridge, MA. Artificial Intelligence Lab.

View-based strategies for 3D object recognition

Sinha, Pawan; and Poggio, Tomaso; Nov. 1994 7 p Limited Reproducibility: More than 20% of this document may be affected by poor print

Contract(s)/Grant(s): (N00014-91-J-4038; NR PROJ. RR0-7047)

Report No.(s): (AD-A295737; AI-M-1518; CBCL-106) Avail: Issuing Activity (Defense Technical Information Center (DTIC))

A persistent issue of debate in the area of 3D object recognition concerns the nature of the experimentally acquired object models in the primate visual system. One prominent proposal in this regard has expounded the use of object centered models, such as representations of the objects' 3D structures in a coordinate frame independent of the viewing parameters Marr and Nishihara, 1978. In contrast to this is another proposal which suggests that the viewing parameters encountered during the learning phase might be inextricably linked to subsequent performance on a recognition task Tarr and Pinker, 1989; Poggio and Edelman, 1990. The 'object model', according to this idea, is simply a collection of the sample views encountered during training. Given that object centered recognition strategies have the attractive feature of leading to viewpoint independence, they have garnered much of the research effort in the field of computational vision. Furthermore, since human recognition performance seems remarkably robust in the face of imaging variations Ellis et al., 1989, it has often been implicitly assumed that the visual system employs an object centered strategy. In the present study we examine this assumption more closely. Our experimental results with a class of novel 3D structures strongly suggest the use of a view-based strategy by the human visual system even when it has the opportunity of constructing and using object-centered models. In fact, for our chosen class of objects, the results seem to support a stronger claim: 3D object recognition is 2D view-based.

DTIC

Human Performance; Image Processing; Pattern Recognition; Three Dimensional Bodies; Visual Perception;

N96-13101*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, FL.

Optimization of moisture content for wheat seedling germination in a cellulose acetate medium for a space flight experiment

Johnson, Corinne F.; (Bionetics Corp., Huntsville, AL.)Dreschel, Thomas W.; (Bionetics Corp., Huntsville, AL.)Brown, Christopher S.; (Bionetics Corp., Huntsville, AL.)and Wheeler, Raymond M.; 1 Jan. 1994 10 p
Report No.(s): (NIPS-95-05511; NASA-TM-111113; NAS 1.15:111113) Avail: CASI HC A02/MF A01

The Porous Tube Plant Nutrient Delivery System (PTPNDS), a hydrophilic, microporous ceramic tube hydroponic system designed for microgravity, will be tested in a middeck locker of the Space Shuttle. The flight experiment will focus on hardware operation and assess its ability to support seed germination and early seedling growth in microgravity. The water controlling system of the PTPNDS hardware has been successfully tested during the parabolic flight of the KC-135. One challenge to the development of

the spaceflight experiment was to devise a method of holding seeds to the cylindrical porous tube. The seed holder must provide water and air to the seed, absorb water from the porous tube, withstand sterilization, provide a clear path for shoots and roots to emerge, and be composed of flight qualified materials. In preparation for the flight experiment, a wheat seed-holder has been designed that utilizes a cellulose acetate plug to facilitate imbibition and to hold the wheat seeds in contact with the porous tube in the correct orientation during the vibration of launch and the microgravity environment of orbit. Germination and growth studies with wheat at a range of temperatures showed that optimal moisture was 78% (by weight) in the cellulose acetate seed holders. These and other design considerations are discussed.

Author

Acetates; Biological Effects; Cellulose; Germination; Gravitational Effects; Microporosity; Moisture; Porosity; Spaceborne Experiments; Wheat;

N96-13105# Army Research Inst. of Environmental Medicine, Natick, MA.

Validation of mathematical models for predicting physiological events during work and heat stress

Kraning, Kenneth K.; Jun. 1995 39 p

Report No.(s): (AD-A295883) Avail: CASI HC A03/MF A01

Protective clothing can readily convert a tolerable long-term working condition into a situation in which exposure time is limited by rapidly accumulating heat strain. It is a challenge to produce simple and universal exposure guidelines for those administering activities of personnel because effects of different clothing types, workloads and environmental conditions on the expected physiological responses are complex. To reduce uncertainties in estimating safe exposure times, computerized biophysical models of temperature regulation are used to forecast physiological responses under different working and environmental conditions and with different clothing ensembles. Extant models emphasize prediction of body core temperature; expected heat casualty rates are assigned to specific levels of body temperature and then the models are used to forecast the time to reach these specific levels.

DTIC

Biophysics; Exposure; Heat Tolerance; Human Tolerances; Mathematical Models; Physiological Effects; Physiological Responses; Protective Clothing;

N96-13143*# Bionetics Corp., Cocoa Beach, FL.

Protein expression in Arabidopsis thaliana after chronic clinorotation

Piastuch, William C.; and Brown, Christopher S.; 1 Jan. 1994 11 p

Contract(s)/Grant(s): (NAS10-11624)

Report No.(s): (NASA-CR-199533; NIPS-95-05510; NAS

1.26:199533) Avail: CASI HC A03/MF A01

Soluble protein expression in *Arabidopsis thaliana* L. (Heynh.) leaf and stem tissue was examined after chronic clinorotation. Seeds of *Arabidopsis* were germinated and plants grown to maturity on horizontal or vertical slow-rotating clinostats (1 rpm) or in stationary vertical control units. Total soluble proteins and in vivo-labeled soluble proteins isolated from these plants were analyzed by two-dimensional sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS PAGE) and subsequent fluorography. Visual and computer analysis of the resulting protein patterns showed no significant differences in either total protein expression or in active protein synthesis between horizontal clinorotation and vertical controls in the *Arabidopsis* leaf and stem tissue. These results show chronic clinorotation does not cause gross changes in protein expression in *Arabidopsis*.

Author

Gravitational Effects; Gravitational Physiology; Plant Stress; Plants (botany); Proteins; Rotating Environments; Vegetation Growth;

N96-13287# Department of Energy, Washington, DC. Assistant Secretary for Environment.

Human radiation experiments associated with the US Department of Energy and its predecessors

Jul. 1995 213 p

Report No.(s): (DE95-015353; DOE/EH-0491) Avail: CASI HC A10/MF A03

This document contains a listing, description, and selected references for documented human radiation experiments sponsored, supported, or performed by the US Department of Energy (DOE) or its predecessors, including the US Energy Research and Development Administration (ERDA), the US Atomic Energy Commission (AEC), the Manhattan Engineer District (MED), and the Office of Scientific Research and Development (OSRD). The list represents work completed by DOE's Office of Human Radiation Experiments (OHRE) through June 1995. The experiment list is available on the Internet via a Home Page on the World Wide Web (<http://www.ohre.doe.gov>). The Home Page also includes the full text of Human Radiation Experiments. The Department of Energy Roadmap to the Story and the Records (DOE/EH-0445), published in February 1995, to which this publication is a supplement. This list includes experiments released at Secretary O'Leary's June 1994 press conference, as well as additional studies identified during the 12 months that followed. Cross-references are provided for experiments originally released at the press conference; for experiments released as part of The DOE Roadmap; and for experiments published in the 1986 congressional report entitled 'American Nuclear Guinea Pigs: Three Decades of Radiation Experiments on US Citizens'. An appendix of radiation terms is also provided.

DOE

Biological Effects; Experimentation; Histories; Human Beings; Information Dissemination; Radiation Effects; Records;

N96-13341# International Centre for Theoretical Physics, Trieste (Italy).

Evolution of the cellular communication system: An analysis in the computational paradigm

Tahirshah, K.; Mar. 1995 10 p

Report No.(s): (DE95-628313; IC-95/33) Avail: CASI HC A02/MF A01 (US Sales Only)

We discuss the problem of the evolution of the cellular communication system from the RNA world to progenote to the modern cell. Our method analyses syntactical structure of molecular fossils in the non-coding regions of DNA within the information-processing gene model developed earlier. We concluded that sequence-specific binding is an ancient communication process with its origin in the RNA world. Moreover, we illustrate our viewpoint using four evolution snapshots from the first RNA segments, some 4.1 billion years ago, to the first cell, 3.8 billion years ago.

DOE

Biological Evolution; Cells (biology); Deoxyribonucleic Acid; Molecular Biology; Ribonucleic Acids;

N96-13769*# South Dakota School of Mines and Technology, Rapid City, SD.

The growth of solar radiated yeast c51

Kraft, Tyrone; In NASA. Goddard Space Flight Center, The 1995 Shuttle Small Payloads Symposium Sep. 1995 p 149-150 (For primary document see N96-13754 02-12) Avail: CASI HC A01/MF A03

This researcher plans to determine if solar radiation affects the growth of yeast. The irradiated yeast was obtained from a sample exposed in space during a Space Shuttle flight of September 9-20, 1994. Further, the control groups were held at: (1) Goddard Space Flight Center (GSFC) in Greenbelt, Maryland; and (2) South Dakota School of Mines and Technology. The procedure used was based on the fact that yeast is most often used in consumable baked goods. Therefore, the yeast was incorporated into a basic Betty Crocker bread recipe. Data was collected by placing measured amounts of dough into sample containers with fifteen minute growth in height measurements collected and recorded. This researcher assumed the viability of yeast to be relative to its ability to produce carbon dioxide gas and cause the dough to rise. As all ingredients and surroundings were equal, this researcher assumed the yeast will produce the only significant difference in data collected. This researcher noted the approximate use date on all sample packages to be prior to arrival and experiment date. All dates equal, it was then assumed each would act in a similar manner of

response. This assumption will allow for equally correct data collection.

Author

Get Away Specials (sts); Growth; Irradiation; Radiation Effects; Solar Radiation; Space Shuttles; Spaceborne Experiments; Yeast;

N96-13770*# Newell High School, Rapid City, SD.

Non-gravitational effects on genus penicillium c51

Loup, Mackenzie; In NASA. Goddard Space Flight Center, The 1995 Shuttle Small Payloads Symposium Sep. 1995 p 151-152 (For primary document see N96-13754 02-12) Avail: CASI HC A01/MF A03

In September 1994, Shuttle Orbiter Discovery, STS-64, launched into space. Aboard that shuttle was a payload containing Fungi spores, genus Penicillium. With the over looking help of Dr. Audrey Gabel, Associate Professor of Biology at Black Hills State University, investigations on differing media types began. Basis for this experimentation was to determine if there was any differences between the space exposed spores and control spores. Studies concluded that there were differences and those differences were then recorded. It was hypothesized the spores may have been effected causing differences in growth rate, colony size, depth and margins, coloring, germination, and growth on different media.

Author

Aerospace Environments; Environment Effects; Fungi; Get Away Specials (sts); Growth; Penicillin; Space Shuttle Orbiters; Spaceborne Experiments; Spores;

N96-13771*# Selfridge High School, Rapid City, SD.

The effects of solar radiation on plant growth c51

Agard, Joslyn; In NASA. Goddard Space Flight Center, The 1995 Shuttle Small Payloads Symposium Sep. 1995 p 153-162 (For primary document see N96-13754 02-12) Avail: CASI HC A02/MF A03

This phase of this continuing project was completed in April, 1994, using Dahlgren #855 hybrid sunflower seeds and Park Seeds #0950 non-hybrid sunflower seeds in both the control groups and the tests groups. The control groups (1, 2, 3, 4, 5, and 6) were grown under normal, un-radiated, conditions. The tests groups (1a, 2a, 3a, 4a, 5a, and 6a) were grown onboard the Space Shuttle Discovery on the STS-60 flight in February 1994. All data from this experiment (both control and test groups) will be taken and recorded in a data log and compared against each other to determine the radiation effects of solar radiation on plant germination and growth.

Author (revised)

Germination; Radiation Effects; Seeds; Solar Radiation; Spaceborne Experiments; Sunflowers; Vegetation Growth;

N96-13783*# Timber Lake High School, Rapid City, SD.
Does solar radiation affect the growth of tomato seeds relative to their environment? c51

Holzer, Kristi; In NASA. Goddard Space Flight Center, The 1995 Shuttle Small Payloads Symposium Sep. 1995 p 257-258 (For primary document see N96-13754 02-12) Avail: CASI HC A01/MF A03

The purpose of this experiment is to sequentially study and analyze the data collected from the germination and growth of irradiated Rutgers Supreme tomato seeds to adult producing plants. This experiment will not use irradiated seeds as a control as I plan to note growth in artificial versus natural environment as the basic experiment.

Author

Irradiation; Physiological Responses; Radiation Effects; Seeds; Solar Radiation; Spaceborne Experiments; Tomatoes; Vegetation Growth;

52 AEROSPACE MEDICINE

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

N96-12204 Illinois Univ., Chicago, IL.

Response of human intervertebral discs to prolonged axial loading and low-frequency vibration Ph.D. Thesis

Li, Siping; 1994 126 p Avail: Univ. Microfilms Order No. DA9426646

Epidemiological studies have identified exposure of the spine to low frequency vibration and to prolonged loading as two important risk factors associated with the low-back pain syndrome. The purpose of this study was to develop lumped parameter models to simulate the response of intervertebral discs to both types of loading. Human thoracic and lumbar intervertebral discs were tested in vitro under both prolonged axial loading and low-frequency vibration. The responses of the discs were measured in axial compression under a constant load, and for cyclic deformation at three frequencies. Experimental results showed significant difference between the responses of thoracic and lumbar discs. Effects of loading frequency and disc degeneration were observed. Linear viscoelastic solid three- and five-parameter models were used to simulate the responses of the thoracic and lumbar intervertebral discs. Model parameters for each disc were determined using a least squares fit to the experimental creep data. The model was subsequently used to predict the response of the disc to low-frequency vibration. Both the three- and five-parameter models simulated the creep response reasonably well. However, the models derived from experimental creep response could not simulate the stress-relaxation response, dynamic modulus, and hysteresis of discs during cyclic deformation. A computational method was developed to estimate the model parameters based on both the creep and

steady-state cyclic load displacement behaviors of an intervertebral disc in compression. The model parameters were determined by solving the following constrained optimization problem: minimize the squared error between the predicted and observed creep response with the constraints that the predicted hysteresis and dynamic modulus be within specified bounds of the experimentally observed values. The models developed in this study to simulate the dynamic response of intervertebral discs will significantly improve the process of designing optimum ways to minimize detrimental effects of dynamic loading to the spine and reduce the incidence of low-back pain.

Dissert. Abstr.

Axial Loads; Back Injuries; Biodynamics; Biological Models (mathematics); Compression Loads; Creep Properties; Cyclic Loads; Dynamic Response; Intervertebral Disks; Lumped Parameter Systems; Spine; Vibration;

N96-12213# Medical Univ. of South Carolina, Charleston, SC.

Environmental Hazards Assessment Program Quarterly Report, Apr. - Jun. 1995

31 Jul. 1995 63 p

Contract(s)/Grant(s): (DE-FG01-92EW-50625)

Report No.(s): (DE95-016211; DOE/EW-50625/T24)

Avail: CASI HC A04/MF A01

The objectives of this report are to (1) develop a holistic, national basis for risk assessment, risk management, and risk communication that recognizes the direct impact of environmental hazards, both chemical and radiation, on the health and well-being of all; (2) develop a pool of talented scientists and experts in cleanup activities, especially in human health aspects; and (3) identify needs and develop programs addressing the critical shortage of well-educated, highly-skilled technical and scientific personnel to address the health oriented aspects of environmental restoration and waste management. This report describes the progress made this quarter in the following areas: public and professional outreach; science programs; clinical programs; and information support and access systems.

DOE

Assessments; Clinical Medicine; Environment Pollution; Information Systems; Public Health; Radiation Hazards; Toxic Hazards;

N96-12226# International Atomic Energy Agency, Vienna (Austria).

Life sciences: Nuclear medicine, radiation biology, medical physics, 1980-1994. International Atomic Energy Agency Publications

Nov. 1994 21 p

Report No.(s): (DE95-625482; INIS-MF-14474; SUBJ/CAT-1994/LS) Avail: CASI HC A03/MF A01 (US Sales Only)

The catalogue lists all sales publications of the IAEA dealing with life sciences issued during the period 1980-1994. The publications are grouped in the following chapters: Nuclear Medicine (including Radio-pharmaceuticals), Radiation Biology and Medical Physics (including Dosimetry).

DOE

Bibliographies; Catalogs (publications); Life Sciences; Nuclear Medicine;

N96-12610*# California Univ., San Francisco, CA.

Experiment 305: Pathophysiology of mineral loss during space flight Final Report

Arnaud, Claude D.; and Cann, Christopher E.; 1 Oct. 1995 34 p

Contract(s)/Grant(s): (NAS9-16227)

Report No.(s): (NASA-CR-188435; NAS 1.26:188435)

Avail: CASI HC A03/MF A01

The objective of this SLS-2 experiment was to determine the pathophysiology of mineral loss during space flight. This was to be accomplished by (1) determining the concentrations of blood minerals and of calciotropic hormones (parathyroid hormone-PTH, vitamin D metabolites) before, during, and after a 14 day shuttle flight, and (2) determining, by calcium kinetic analysis (using stable calcium isotopes), the influence of space flight on intestinal calcium absorption.

Author

Aerospace Medicine; Gravitational Effects; Gravitational Physiology; Minerals; Physiological Effects; Space Transportation System Flights; Spaceborne Experiments;

N96-12735# Logistics Management Inst., McLean, VA.

US Army health hazard assessment program strategy

Bratt, Gary M.; and Evenden, James J.; 1 Jan. 1995 38 p

Report No.(s): (AD-A294684) Avail: CASI HC A03/MF A01

The U.S. Army Health Hazard Assessment Program is the cornerstone that provides unity of direction and purpose for all Army activities concerned with health hazard issues in the management of systems throughout their life cycle. This document provides the Army strategies goals, and objectives in pursuing the vision of being a national leader in eliminating health hazards and integrating human performance criteria into the life cycle management of material systems. The Army will use the framework set forth in this strategy to dramatically decrease and control health hazards in materiel systems. It will be the basis for planning, programming, and budgeting decisions to support the Army's Health Hazard Assessment Program.

DTIC

Assessments; Decision Making; Hazards; Health; Human Performance; Management Planning; Military Operations;

N96-12825# Air Force Inst. of Tech., Wright-Patterson AFB, OH.

The application of audiometric data base analysis to selected Air force bases M.S. Thesis

Thomas, Jonathan W.; 1995 108 p

Report No.(s): (AD-A294656; AFIT-95-027) Avail: CASI HC A06/MF A02

This paper focuses on using Audiometric Data Base Analysis (ADBA) to evaluate the effectiveness of the hearing conservation program (HCP) at eight Air Force Bases. The primary goal is to evaluate the effectiveness of the HCP for all eight bases combined. The secondary goal was determining which groups of personnel are experiencing the most variability in their hearing threshold levels (HTL's). The ADBA results revealed that the total group exhibited a program that was between marginal and unacceptable. Breaking the total group's audiometric data into smaller groups did not reveal a significantly different variability by group with the exception of gender. Females had significantly less variability in their mean HTL's when compared to males. The standard deviation of differences of HTL's measure did not give similar results to the other measures. The use of the standard deviation of difference of HTL's measure is not recommended for use under the present guidelines. An overall distribution of TWA's (time weighted averages) for the total group showed a fairly normal distribution with the 50th percentile at 85 dBA (A frequency-weighted sound pressure level). The 10th percentile is 77 dBA and 90th percentile is 94 dBA for the total population.

DTIC

Audiometry; Ear Pressure Test; Hearing; Sound Pressure; Statistical Distributions; Thresholds (perception);

N96-12979* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

Method and apparatus for non-invasive evaluation of diaphragmatic function Patent

Yost, William T.; inventor (to NASA)Wait, Juliette L.; inventor (to NASA) (Veterans Administration, Washington, DC.)Nahormek, Patricia A.; inventor (to NASA) (Veterans Administration, Washington, DC.)Cantrell, John H.; inventor (to NASA)and Hanna-Hawver, Pamela D.; inventor (to NASA) (Analytical Services and Materials, Inc., Hampton, VA.) 12 Sep. 1995 8 p Filed 14 Feb. 1994 Supersedes N95-20408 (33 - 6, p 1441)

Report No.(s): (NASA-CASE-LAR-13888-1; US-PATENT-5,448,995; US-PATENT-APPL-SN-195500; US-PATENT-CLASS-128-660.07; INT-PATENT-CLASS-A61B-8/00) Avail: US Patent and Trademark Office

A method for non-invasive evaluation of diaphragmatic function in humans measures the thickness of the diaphragm in real time with an ultrasonic device, and displays the variations of diaphragm thickness versus time. Formulae are given for calculating a quantitative value for the reserve

fatigue capacity of a patient's diaphragm from data obtained by measuring the time limits for maintaining a constant breathing pattern on the display at two different pressure differentials in series with the patient's airways. An apparatus for displaying the diaphragm thickness in real time is also described. The method can be used both on healthy patients and on patients with so severe breathing dysfunctions that they require breathing support from respirators.

Official Gazette of the U.S. Patent and Trademark Office
Breathing Apparatus; Diaphragm (anatomy); Measuring Instruments; Medical Equipment; Respirators; Ultrasonics;

N96-12980* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

Acoustic calibration apparatus for calibrating plethysmographic acoustic pressure sensors Patent

Zuckerwar, Allan J.; inventor (to NASA) and Davis, David C.; inventor (to NASA) 12 Sep. 1995 6 p Filed 11 May 1994 Supersedes 95N-20763 (33 - 6, p 1443)

Report No.(s): (NASA-CASE-LAR-14977-1; US-PATENT-5,448,904; US-PATENT-APPL-SN-243665; US-PATENT-CLASS-73-1/DV; INT-PATENT-CLASS-G01H-17/00)
Avail: US Patent and Trademark Office

An apparatus for calibrating an acoustic sensor is described. The apparatus includes a transmission material having an acoustic impedance approximately matching the acoustic impedance of the actual acoustic medium existing when the acoustic sensor is applied in actual in-service conditions. An elastic container holds the transmission material. A first sensor is coupled to the container at a first location on the container and a second sensor coupled to the container at a second location on the container, the second location being different from the first location. A sound producing device is coupled to the container and transmits acoustic signals inside the container.

Official Gazette of the U.S. Patent and Trademark Office
Acoustic Impedance; Acoustic Measurement; Calibrating; Medical Equipment; Plethysmography; Pressure Sensors;

N96-13283# Armstrong Lab., Brooks AFB, TX. Aerospace Medicine Directorate.

Review of case file for aeromedical disposition of prolactinomas Technical Memorandum

Pickard, Jeb S.; 7 Apr. 1995 6 p

Contract(s)/Grant(s): (AF PROJ. 7755)

Report No.(s): (AD-A295884; AL/AO-TM-1995-02)
Avail: CASI HC A02/MF A01

A ease of giant invasive prolactinoma in a Royal Australian Air Force aviator prompted a literature review to determine fitness to fly. Particular areas of emphasis included effects and side effects of treatment, particularly bromocriptine therapy, and neurologic and endocrine effects of the

tumor. With presently available therapy, this condition was felt to be incompatible with military aviation.

DTIC

Aircraft Pilots; Endocrinology; Flight Fitness; Neoplasms;

N96-13368*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, FL.

Muscle preservation in long duration space missions: The eccentric factor

Buchanan, Paul; Dudley, Gary A.; Tesch, Per A.; and Hather, Bruce M.; 5 Apr. 1990 19 p Presented at the 3rd Nihon University International Symposium on Aerospace Science, Tokyo, Japan, 1-5 Apr. 1990

Report No.(s): (NASA-TM-111111; NAS 1.15:11111; NIPS-95-05517) Avail: CASI HC A03/MF A01

In our quest to understand, and eventually prevent, the loss of muscle strength and mass that occurs during prolonged periods in microgravity, we have organized our research approach by systems and useful terrestrial analogs. Our hypothesis was that: The eccentric movement, or lengthening component, of dynamic, resistive exercise, is required for the production of the greatest gains in strength and muscle hypertrophy in the most metabolically efficient, and time effective manner. The exercises selected were leg presses, leg (knee) extensions, and hamstring curls. In this 30 week study, 38 male subjects, between the ages of 25 and 50, were divided into four groups. One group performed 5 sets of 8-12 repetitions per set of conventional concentric/eccentric (CON/ECC) exercises. Another group performed only the concentric (CON) movement on the same schedule. The third group performed twice the number of sets in the concentric only mode (CON/CON), and the last group served as controls. We interpret these data as convincing evidence that the eccentric component of heavy resistance training is required along with the concentric for the most effective increase in strength and muscle fiber size in the least time. We also conclude that such heavy exercise of any such muscle group need not consume inordinately long periods of time, and is quite satisfactorily effective when performed on 72 hour centers.

Derived from text

Aerospace Medicine; Microgravity; Physical Exercise; Physiological Tests; Space Flight Stress;

N96-13782*# Utah Univ., Salt Lake City, UT.

Characterization of fluid physics effects on cardiovascular response to microgravity (G-572) c52

Pantalos, George M.; Bennett, Thomas E.; (Bellarmine-Ursuline Coll., Louisville, KY.)Sharp, M. Keith; Woodruff, Stewart; Oleary, Sean; Gillars, Kevin; Lemon, Mark; (Utah State Univ., Logan, UT.)and Sojka, Jan; (Utah State Univ., Logan, UT.) In NASA. Goddard Space Flight Center, The 1995 Shuttle Small Payloads Symposium Sep. 1995

p 255-256 (For primary document see N96-13754 02-12)
 Avail: CASI HC A01/MF A03

The investigation of cardiovascular adaptation to space flight has seen substantial advancement in the last several years. In-flight echocardiographic measurements of astronaut cardiac function on the Space Shuttle have documented an initial increase, followed by a progressive reduction in both left ventricular volume index and stroke volume with a compensatory increase in heart rate to maintain cardiac output. To date, the reduced cardiac size and stroke volume have been presumed to be the consequence of the reduction in circulating fluid volume within a few days after orbital insertion. However, no specific mechanism for the reduced stroke volume has been identified. The following investigation proposes the use of a hydraulic model of the cardiovascular system to examine the possibility that the observed reduction in stroke volume may, in part, be related to fluid physics effects on heart function. The automated model is being prepared to fly as a Get Away Special (GAS) payload within the next year.

Author

Bionics; Cardiovascular System; Experiment Design; Fluid Dynamics; Get Away Specials (sts); Gravitational Effects; Heart Function; Microgravity; Physiological Responses; Physiological Tests; Spaceborne Experiments; Stroke Volume;

N96-13885# Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, The Hague (Netherlands). Physics and Electronics Lab.

Calculating the 3-D absorbed power distribution inside a human body that is illuminated by an incident EM field using the WCG-FFT method c52

Zwamborn, A. Peter M.; In AGARD, High Power Microwaves (HPM), Volume 1 Mar. 1995 5 p (For primary document see N96-13860 02-32) Copyright Avail: CASI HC A01/MF A03

During the past several years considerable effort has been put into the development of computational techniques for handling the scattering and diffraction of electromagnetic waves by an object. We can distinguish between global techniques (e.g., the use of wave function expansion and integral equation) and local techniques (finite-difference and finite-elements methods). In this paper we present a global technique to solve the full three-dimensional scattering problem by strongly inhomogeneous objects. This domain-integral is formulated in the frequency-domain. The strong form is weakened by using appropriate test functions and expansion functions. Subsequently, the domain-integral equation obtained is then solved using an iterative Conjugate Gradient scheme combined with an efficient computation of the convolutional integral involved by using the Fast Fourier Transform algorithm (WCG-FFT method). In order to show

the accuracy of the method with the scattering problem by an inhomogeneous dielectric sphere with the Mie-series solution. Then, numerical computations are carried out on a MRI-scan generated model of a human body inside a metallic enclosure with apertures. Here, we present the absorbed power density inside the human body.

Author

Algorithms; Conjugate Gradient Method; Electromagnetic Wave Transmission; Fourier Transformation; Human Body; Integral Equations; Mie Scattering; Wave Diffraction; Wave Functions;

N96-13932* National Aeronautics and Space Administration, Washington, DC.

Aerospace medicine and biology: A continuing bibliography with indexes (supplement 407)

Nov. 1995 100 p

Report No.(s): (NASA-SP-7011(407); NAS 1.21:7011(407))

Avail: CASI HC A05

This bibliography lists 289 reports, articles and other documents announced in the NASA Scientific and Technical Information System during Nov. 1995. Subject coverage includes: aerospace medicine and physiology, life support systems and man/system technology, protective clothing, exobiology and extraterrestrial life, planetary biology, and flight crew behavior and performance.

Author

Aerospace Medicine; Bibliographies; Biological Effects; Exobiology; Indexes (documentation); Life Sciences;

N96-13980# Department of the Army, Washington, DC. Preventive Medicine Consultants Div.

US Army Health Hazard Assessment Manual: Procedures guide

Bratt, Gary M.; and Schmitt, Judi; ed. 1 Oct. 1994 397 p

Report No.(s): (AD-A294681) Avail: CASI HC A17/MF A04

The Health Hazard Assessment Community is developing a comprehensive strategy that builds upon past accomplishments and provides a framework for the Army to meet the growing health hazard challenges we face as we enter the next century. A formal strategy-- focusing on prevention, protection, performance, and sustainment--will provide a mechanism for identifying new opportunities and defining ways to meet this responsibility as part of our mission to maintain a trained and ready Army. This manual is part of the strategy and provides an orientation to the U.S. Army's HHAP for systems acquisition. It is intended for independent medical assessors, CBTDEV's, MATDEV's, and system MANPRINT practitioners and other independent assessors. This manual focuses on practical information in the context of the Army's materiel acquisition process (life cycle system

AEROSPACE MEDICINE AND BIOLOGY

management) and is a resource for individuals striving to eliminate or control health hazards in Army systems.

DTIC

Assessments; Hazards; Health; Human Performance; Management Planning; Military Operations;

N96-14017# Duke Univ., Durham, NC. Environmental Lab.

Statistical bubble dynamics algorithms for assessment of altitude decompression sickness incidence Final Technical Report, Jun. 1992 - Oct. 1994

Gerth, Wayne A.; and Vann, Richard D.; Jul. 1995 103 p
Contract(s)/Grant(s): (F33615-90-D-0606; AF PROJ. 2830)
Report No.(s): (AD-A297456; AL/CF-TR-1995-0037)
Avail: CASI HC A06/MF A02

Air Force personnel are routinely exposed to atmospheric decompressions that often incur significant risk of decompression sickness (DCS). Management of these risks requires analytic methods able to: (1) define risk/hazard envelopes for all routine and emergency decompressions, (2) assess the DCS risks included or introduced in the contemplation or design of new operational procedures and equipment, and (3) support real-time monitoring of DCS risk incurred by personnel during various chamber and aircraft operations. Present work contributed to meeting these requirements through development and application of methods by which DCS risks during decompression profiles are determined from statistical/biophysical models of in vivo gas exchange and bubble growth and resolution using maximum likelihood, both logistic and survival models were fit to DCS incidence data from the USAF Armstrong Laboratory (USAFAL) for a wide variety of decompression profiles. The models were incorporated into software that operates on personal computers. System software, including a data transcription routine to serve as a software interface between the USAFAL Hypobaric Decompression Sickness Database and the present modeling system, was delivered for use and evaluation of USAFAL personnel.

DTIC

Algorithms; Altitude Sickness; Decompression Sickness; Gas Exchange; Hypobaric Atmospheres; Pressure Reduction; Risk;

N96-14066# North Dakota State Univ., Fargo, ND. Dept. of Electrical and Electronics Engineering.

Eye tracking performance variability in a homogeneous population

Engelken, Edward J.; (Armstrong Lab., Brooks AFB, TX.)Stevens, Kenneth W.; (Armstrong Lab., Brooks AFB, TX.)McQueen, William J.; (Armstrong Lab., Brooks AFB, TX.)and Enderle, John D.; Oct. 1994 6 p

Report No.(s): (AD-A297094; AL/AO-PC-1994-0040)
Avail: CASI HC A02/MF A01

Pursuit tracking eye movements were recorded and analyzed from a group of US Air Force Pilot Candidates (PC's). The PO's ranged in age from 21 to 27 with a median age of 23. All were college graduates and recently passed a Flying Class I physical exam. These PO's comprise a highly motivated, intelligent group of young subjects. Pursuit tracking was assessed by having the subjects track a small spot of green light moving sinusoidally in the horizontal plane at frequencies from 0.2 to 1.0 Hz in 0.2 Hz increments. Peak-to-peak target amplitude was 400. Eye movements were recorded using an infrared reflectance device. Eye movements were separated into smooth pursuit (SP) and saccadic (SA) components. Tracking performance was evaluated by computing the gain and asymmetry' of the SP component and the percentage of tracking movements contributed by the SA component. Both mean values and variance of the tracking performance of the PCs were not found to be statistically different from a group consisting of both flying and nonflying Air Force personnel.

DTIC

Aerospace Medicine; Armed Forces (United States); Eye (Anatomy); Flying Personnel; Populations; Pursuit Tracking; Saccadic Eye Movements; Variability;

53 BEHAVIORAL SCIENCES

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

N96-12560# Federal Aviation Agency, Washington, DC. Office of Aviation Medicine.

Airman research questionnaire: Methodology and overall results Final Report

Hunter, David R.; 1 Oct. 1995 67 p

Report No.(s): (DOT/FAA/AM-95/27) Avail: CASI HC A04/MF A01

A nationwide survey of 19,657 pilots was performed to collect information on their aviation qualifications and experiences, their participation in training activities, their involvement in critical aviation incidents, their personal minimums and usual practices when planning and conducting a flight, and their attitudes about flying issues. Results are based on returns received from 35 % of the overall sample. Analyses were conducted to assess possible bias due to nonresponse effects by comparing respondent and nonrespondent groups on accident involvement, age, gender, and recent and total flight experience. No differences in accident involvement or in total flight experience were found. However, on average, the respondent group tended to be slightly older and to have slightly less recent flight experience than the nonrespondent group. The implications of these findings are discussed and cautions regarding the interpretation of the results are given. This initial report describes the methodology used in construction of the questionnaire and the proce-

dures used for data collection. The percentages of respondents selecting each of the response alternatives for each question in the questionnaire are provided. Means, standard deviations, and medians are reported for those questions requiring exact numerical entries. Separate analyses of all items are given for private, commercial, and airline transport certificate categories. Possible applications of the data obtained from this study are discussed and proposed follow-on analyses to be conducted and reported in additional reports are described.

Author

Aircraft Safety; Flight Safety; Pilots (personnel); Surveys;

N96-12670# California Univ., Riverside, CA.
Multistrategy learning for image understanding Final Technical Report, 30 Sep. 1993 - 29 Dec. 1994

Bhanu, Bir; 15 Feb. 1995 205 p

Contract(s)/Grant(s): (F49620-93-1-0624)

Report No.(s): (AD-A295440; AFOSR-95-0298TR) Avail: CASI HC A10/MF A03

Current Image Understanding (IU) algorithms and systems lack the flexibility and robustness to successfully handle complex real-world situations. Robust 3-D object recognition, in real-world applications operating under changing environmental conditions, remains one of the important but elusive goals of IU research. We believe that an innovative combination of IU and Machine Learning (ML) techniques will lead to the advancement of the IU field in general. IU itself has come to a certain state of maturity, in that we have today a good understanding of the essential components, their functionality, and the architectural issues involved. IU processes are commonly separated into three hierarchical layers, called the low, intermediate, and high level. At each of these levels, ML techniques can be employed selectively to improve the overall recognition performance. By introducing adaptation of task parameters; maintenance of internal representations and hypotheses pertaining to the observed reality; and learning new concepts and recognition strategies. The incorporation of learning into IU algorithms and systems will result in adaptation and robustness capability since learning provides automatic knowledge acquisition and continuous improvement of recognition system performance.

DTIC

Image Processing; Knowledge Based Systems; Machine Learning; Markov Processes; Pattern Recognition; Target Acquisition; Target Recognition; Three Dimensional Bodies;

N96-12722# Armstrong Lab., Brooks AFB, TX. Human Resources Directorate.

Designing instructional simulations: Effects of instruc-

tional control and type of training task on developing display-interpretation skills Final Report, Mar. - Dec. 1994

Mattoon, Joseph S.; Apr. 1995 30 p

Contract(s)/Grant(s): (AF PROJ. 1123)

Report No.(s): (AD-A294744; AL/HR-TR-1995-0017)

Avail: CASI HC A03/MF A01

Instructional simulation is becoming a major vehicle for teaching dynamic technical skills to aircrew members. However, few design principles are available that specify the most effective task formats and strategies for controlling events within instructional simulations. Part- and whole-task training formats and learner- and program-control strategies were investigated separately in two experiments using a microcomputer-based instructional simulation that taught adults how to interpret spatial information on a simple head-up display. These two variables were then completely crossed in a third experiment to examine potential interactions. Program control and part-task training resulted in the best performance, and significant interactions were detected among the two training variables. Implications on the design of instructional simulations are discussed.

DTIC

Computer Assisted Instruction; Computerized Simulation; Flight Crews; Flight Training; Training Simulators; Visual Tasks;

N96-12831# Massachusetts Inst. of Tech., Cambridge, MA. Artificial Intelligence Lab.

Reciprocal interactions between motion and form perception

Sinha, Pawan; Nov. 1994 10 p

Contract(s)/Grant(s): (N00014-91-J-4038)

Report No.(s): (AD-A295739; MIT-AIM-1506; MIT-CBCL-104) Avail: CASI HC A02/MF A01

The processes underlying the perceptual analysis of visual form are believed to have minimal interaction with those subserving the perception of visual motion (Livingstone and Hubel, 1987; Victor and Conte, 1990). Recent reports of functionally and anatomically segregated parallel streams in the primate visual cortex seem to support this hypothesis (Ungerlieder and Mishkin, 1982; VanEssen and Maunsell, 1983; Shipp and Zeki, 1985; Zeki and Shipp, 1988; De Yoe et al., 1994). Here we present perceptual evidence that is at odds with this view and instead suggests strong symmetric interactions between the form and motion processes. In one direction, we show that the introduction of specific static figural elements, say 'F', in a simple motion sequence biases an observer to perceive a particular motion field, say 'M'. In the reverse direction, the imposition of the same motion field 'M' on the original sequence leads the observer to perceive illusory static figural elements 'F'. A specific implication of these findings concerns the possible

existence of (what we call) motion end-stopped units in the primate visual system.

DTIC

Motion Perception; Space Perception; Symmetry; Two Dimensional Bodies;

N96-13246*# Old Dominion Univ., Norfolk, VA. Dept. of Psychology.

Functional relationships among monitoring performance: Subjective report of thought process and compromising states of awareness Final Report, ended 30 Sep. 1995

Freeman, Frederick; Sep. 1995 29 p

Contract(s)/Grant(s): (NCC1-176)

Report No.(s): (NASA-CR-199249; NAS 1.26:199249)

Avail: CASI HC A03/MF A01

A biocybernetic system for use in adaptive automation was evaluated using EEG indices based on the beta, alpha, and theta bandwidths. Subjects performed a compensatory tracking task while their EEG was recorded and one of three engagement indices was derived: beta/(alpha + theta), beta/alpha, or 1/alpha. The task was switched between manual and automatic modes as a function of the subjects' level of engagement and whether they were under a positive or negative feedback condition. It was hypothesized that negative feedback would produce more switches between manual and automatic modes, and that the beta/(alpha + theta) index would produce the strongest effect. The results confirmed these hypotheses. There were no systematic changes in these effects over three 16-minute trials. Tracking performance was found to be better under negative feedback. An analysis of the different EEG bands under positive and negative feedback in manual and automatic modes found more beta power in the positive feedback/manual condition and less in the positive feedback/automatic condition. The opposite effect was observed for alpha and theta power. The implications of biocybernetic systems for adaptive automation are discussed.

Author (revised)

Alertness; Biofeedback; Cybernetics; Electroencephalography; Human Performance; Negative Feedback; Positive Feedback;

N96-13945# Florida Maxima Corp., Winter Park, FL.

Simulation and training for stress environments: A meta-analytic and experimental evaluation

Driskell, James E.; and Mullen, Brian; Jun. 1995 9 p Prepared in cooperation with Syracuse Univ., NY

Contract(s)/Grant(s): (MDA903-90-C-0102)

Report No.(s): (AD-A297385; ARI-RN-95-38) Avail: CASI HC A02/MF A01

A vast amount of research on stress and training has been conducted in the past several decades. This research identifies approaches that are potentially effective for stress

training, but often produces conflicting results that are difficult to interpret at the narrative level. It also describes a series of meta-analytic studies undertaken as part of a research project to integrate and summarize the research literature on stress training. The technical approach examined those training approaches that the research literature suggests may be effective for enhancing performance under stress, including overlearning, mental practice, stress inoculation training, cohesiveness, team building, and relaxation training. This approach provided the opportunity to gauge, on a quantitative basis, the overall effectiveness of alternative training approaches. Second, it allowed the identification of factors that moderate the effectiveness of these training approaches to determine the most effective means to implement a specific training approach. Finally, this strategy provided precise direction for further research and application.

DTIC

Learning; Mental Performance; Simulation; Stress (psychology);

N96-13965# Armstrong Lab., Brooks AFB, TX. Aircrew Training Research Div.

Training requirements utility evaluation Final Report, Jul. 1992 - Jun. 1994

Crane, Peter M.; Mar. 1995 31 p

Contract(s)/Grant(s): (AF PROJ. 2743)

Report No.(s): (AD-A296502; AL/HR-TR-1994-0167)

Avail: CASI HC A03/MF A01

Opportunities for in-flight training for air combat pilots are becoming increasingly constrained. Limitations include safety, cost, airspace, and security. Combat engagement simulations allow human warfighters and their simulated weapon systems to engage other warfighters on a virtual battlefield. Two systems for multiplayer, air combat simulation were evaluated. One system was based on super-minicomputers by United States Air Force F-15 pilots and air weapons controllers for acceptability and training effectiveness.

DTIC

Combat; Computerized Simulation; Flight Simulation; Flight Simulators; Flight Training; Training Evaluation;

N96-13979# Institute for Human Factors TNO, Soesterberg (Netherlands).

Target acquisition: Human observer performance studies and TARGAC model validation Final Report

Valeton, J. M.; Bijl, P.; and Gillespie, Patti; ed. (Army Research Lab., Adelphi, MD.) Apr. 1995 184 p

Report No.(s): (AD-A297133; ARL-CR-202) Avail: CASI HC A09/MF A02

Human target acquisition performance was studied using the thermal imagery that was collected during Battlefield Emissives Sources Trials under the European Theater Weather and Obscurants, (BEST TWO), organized

by NATO AC243/Panel4/RSG.15 in 1990. Recognition and identification probabilities were measured for a large number of stationary and moving targets at ranges between 1 and 4 km. Target detection was not investigated in a number of carefully controlled laboratory experiments. The target acquisition model (TAROAC) was validated by comparing its predictions with observed recognition ranges. For all trials used in the observer experiments, TARGAC predictions were calculated on the basis of meteorological, target, background, and time information measured in the field. The major conclusion of the observer experiments is that the human acquisition performance depends considerably on factors such as target structure, local terrain structure, and cognitive factors. In TARGAC, these factors are not modeled. For the best two situation, the model predictions were determined solely by target size and thermal imager resolution limit. A quantitative comparison between actual and predicted recognition ranges shows that TARGAC systematically underestimates human acquisition performance: on average, observed recognition ranges are a factor of 1.8 longer than the model predictions.

DTIC

Human Performance; Infrared Imagery; Night Vision; Performance Tests; Target Acquisition; Target Recognition; Thermal Radiation; Visual Tasks;

N96-14025# Institute for Defense Analyses, Alexandria, VA.

A search for understanding: Analysis of human performance on target acquisition and search tasks using eye-tracker data Final Report, Jun. 1994 - May 1995

Nicoll, Jeffrey F.; and Hsu, David H.; Jun. 1995 88 p

Contract(s)/Grant(s): (DASW01-94-C-0054)

Report No.(s): (AD-A297602; IDA-P-3036; IDA/HQ-94-46051) Avail: CASI HC A05/MF A01

This paper provides an analysis of recent human field-of-view search performance experiments performed by the Night Vision Laboratory. The experiments used trained subjects in examining simulated infrared imagery and employed in the 4B experiment an eye-tracker to enable monitoring the subjects search process. The data will be analyzed in the context of a recently proposed extension of the standard or 'classical' human search model, called 'the neoclassical model.' The purpose of the analysis is to determine whether or not the assumptions underlying the neoclassical model and its detailed conclusions can be verified in actual experimental data.

DTIC

Eye Movements; Infrared Imagery; Night Vision; Target Acquisition; Tracking (position); Visual Acuity; Visual Tasks;

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

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

N96-12469 Drexel Univ., Philadelphia, PA.

A 3-D musculoskeletal model for occupational workstation optimization Ph.D. Thesis

Bo, Lin; 1993 159 p Avail: Univ. Microfilms Order No. DA9407131

Many occupational injuries result from excessive loading of the musculoskeletal system. Biomechanical modeling is the only means to predict potentially hazardous loading conditions on certain musculoskeletal components. The objective of this dissertation is to develop a three dimensional mechanical model which can provide not only the moment loading on the 13 main joints, but also the muscle tensions in the main muscles of the neck, shoulder, and the lower extremities of human body under different working postures. Electromyography (EMG) is the only way to identify the muscle activity directly. A EMG computer processing program has been proposed. A universal adjustable workstand was instrumented with six force transducers and was used to investigate appropriate working postures which can minimize the muscle loading, and in turn prevent the occupational injuries. A new technique has been proposed during the modeling of the neck system. This new method is a combination of the previous methods and considers both the external loading and the muscle deformation. Therefore this new method provided more accurate prediction of muscle forces, and makes this model applicable in a wider range.

Dissert. Abstr.

Biodynamics; Clinical Medicine; Electromyography; Human Body; Medical Equipment; Muscular Function; Musculoskeletal System; Three Dimensional Models; Workstations;

N96-13127 Navy Clothing and Textile Research Facility, Natick, MA.

A review: US Navy (NCTRF) evaluation of microclimate cooling systems Final Report

Teal, Jr., Walter B.; and Pimental, Nancy A.; Apr. 1995 52 p Limited Reproducibility: More than 20% of this document may be affected by poor print

Report No.(s): (AD-A295788; NCTRF-TR-206) Avail: Issuing Activity (Defense Technical Information Center (DTIC))

The U.S. Navy Clothing & Textile Research Facility has been involved in the development and testing of microclimate cooling systems (MCS) for several decades. MCS have significantly reduced heat strain in hot environments when worn with either general utility or encapsulating garments.

Passive cooling systems, available to the Fleet under a commercial item description, have proven most effective for use with general utility clothing for U.S. Navy applications. Because of problems associated with replenishment, the commercial passive systems are of limited use with encapsulating garments. Prototype passive and active systems for use with encapsulating clothing have been developed and have significantly reduced heat strain in laboratory tests; further development is required to enhance the reliability of these systems.

DTIC

Air Conditioning Equipment; Cooling Systems; Heat Tolerance; Human Tolerances; Liquid Cooling; Microclimatology; Physiological Effects; Protective Clothing; Stress (physiology);

N96-13352*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

Trace chemical contaminant generation rates for spacecraft contamination control system design

Perry, J. L.; Washington Aug. 1995 70 p

Report No.(s): (NASA-TM-108497; NAS 1.15:108497)
Avail: CASI HC A04/MF A01

A spacecraft presents a unique design challenge with respect to providing a comfortable environment in which people can live and work. All aspects of the spacecraft environmental design including the size of the habitable volume, its temperature, relative humidity, and composition must be considered to ensure the comfort and health of the occupants. The crew members and the materials selected for outfitting the spacecraft play an integral part in designing a habitable spacecraft because material offgassing and human metabolism are the primary sources for continuous trace chemical contaminant generation onboard a spacecraft. Since these contamination sources cannot be completely eliminated, active control processes must be designed and deployed onboard the spacecraft to ensure an acceptably clean cabin atmosphere. Knowledge of the expected rates at which contaminants are generated is very important to the design of these processes. Data from past spacecraft missions and human contaminant production studies have been analyzed to provide this knowledge. The resulting compilation of contaminants and generation rates serve as a firm basis for past, present, and future contamination control system designs for space and aeronautics applications.

Author

Metabolic Wastes; Offgassing; Reaction Kinetics; Spacecraft Cabin Atmospheres; Spacecraft Contamination; Spacecraft Environments; Trace Contaminants;

N96-13450*# Lamar Univ., Beaumont, TX. Dept. of Chemical Engineering.

Supporting technology for the development of Controlled Ecological Life Support Systems (CELSS) Final Report

Li, Ku-Yen; Yaws, Carl L.; Simon, William E.; and Mei, Harry T.; 30 Aug. 1995 118 p

Contract(s)/Grant(s): (NAG9-697)

Report No.(s): (NASA-CR-199665; NAS 1.26:199665; NIPS-95-05645) Avail: CASI HC A06/MF A02

To support the development of Controlled Ecological Life Support Systems (CELSS) in the space program, a metabolic simulator has been selected for use in a closed chamber to test functions of the CELSS. This metabolic simulator is a catalytic reactor which oxidizes the methyl acetate to produce carbon dioxide and water vapor. In this project, kinetic studies of catalytic oxidation of methyl acetate were conducted using monolithic and pellet catalysts with 0.5% (by weight) platinum (Pt) on aluminum oxide (Al₂O₃). The reaction was studied at a pressure of one atmosphere and at temperatures varying from 160 C to 420 C. By-products were identified at the exit of the preheater and reactor. For the kinetic study with the monolithic catalyst, a linear regression method was used to correlate the kinetic data with zero-order, first-order and Langmuir-Hinshelwood models. Results indicate that the first-order model represents the data adequately at low concentrations of methyl acetate. For higher concentrations of methyl acetate, the Langmuir-Hinshelwood model best represents the kinetic data. Both rate constant and adsorption equilibrium constants were estimated from the regression. A Taguchi orthogonal array (L₍₉₎) was used to investigate the effects of temperature, flow rate, and concentration on the catalytic oxidation of methyl acetate. For the monolithic catalyst, temperature exerts the most significant effect, followed by concentration of methyl acetate. For the pellet catalyst, reaction temperature is the most significant factor, followed by gas flow rate and methyl acetate concentration. Concentrations of either carbon dioxide or oxygen were seen to have insignificant effect on the methyl acetate conversion process. Experimental results indicate that the preheater with glass beads can accomplish thermal cracking and catalytic reaction of methyl acetate to produce acetic acid, methanol, methyl formate, and 1-propanol. The concentration of all by-products was measured in ppmv (parts per million by volume). At higher temperatures, greater amounts of these products are produced, as expected. In all cases, methanol was the predominant concentration detected, followed by methyl formate. At temperatures lower than 320 C for the P-type monolithic catalyst, methanol, acetic acid, and acetone were detected, whereas, for the E-type monolithic catalyst, only methanol was detected at 160 C. Both P and E types of the monolithic catalyst were specified with the same substrates (ceramic), washcoat (Al₂O₃), and promoter (Pt). However, the manufacturing and treatment procedures were quite different. It was therefore concluded that the performance of the E-type monolithic catalyst is superior to that of the P-type for oxidation of methyl acetate. At higher reaction temperatures, e.g., above 420 C, all reactants and byproducts were

completely oxidized using these two types of monolithic catalyst to produce carbon dioxide and water vapor. A complex heterogeneous catalytic reaction mechanism was proposed to explain the formation of the byproducts (methanol, acetic acid, and methyl formate) as the methyl acetate traveled through the preheater packed with glass beads. The by-product, 1-propanol, may be formed only through a homogeneous reaction, since it is difficult to develop a reasonable sequence of heterogeneous reaction steps to explain its formation. The homogeneous thermal decomposition of methyl acetate to form free radicals was proposed to explain the formation of 1-propanol, and also methanol, in the preheater. A dual-site catalytic reaction mechanism was proposed for the oxidation of methyl acetate over Pt/Al₂O₃ monolithic catalyst. The dual-site mechanism describes the chemisorption of oxygen molecules as well as a physical adsorption of methyl acetate on the active sites. On the active sites, methyl acetate is oxidized rapidly to form carbon dioxide and water vapor. A rate equation derived from this mechanism gives the Langmuir-Hinshelwood rate formula which has been observed from the experimental data obtained in this project for high methyl acetate concentration (greater than 1000 ppmv) over a monolithic catalyst. If the oxygen concentration is very high and methyl acetate concentration is very low, the reaction rate equation is then reduced to a first-order with respect to methyl acetate concentration. The first-order model has also been observed from the experimental data obtained in this project for low methyl acetate concentration (less than 1000 ppmv).

Author

Acetates; Aluminum Oxides; By-products; Catalysts; Catalytic Activity; Closed Ecological Systems; Mathematical Models; Methyl Compounds; Oxidation; Platinum; Reaction Kinetics; Temperature Effects;

N96-13451*# Massachusetts Inst. of Tech., Cambridge, MA. Dept. of Aeronautics and Astronautics.

Dynamic analysis of astronaut motions in microgravity: Applications for Extravehicular Activity (EVA) Annual Report

Newman, Dava J.; 3 Nov. 1995 79 p Original contains color illustrations

Contract(s)/Grant(s): (NAGW-4336)

Report No.(s): (NASA-CR-199668; NAS 1.26:199668; NIPS-95-05667) Avail: CASI HC A05/MF A01; 4 functional color pages

Simulations of astronaut motions during extravehicular activity (EVA) tasks were performed using computational multibody dynamics methods. The application of computational dynamic simulation to EVA was prompted by the realization that physical microgravity simulators have inherent limitations: viscosity in neutral buoyancy tanks; friction in air bearing floors; short duration for parabolic aircraft; and inertia and friction in suspension mechanisms. These limita-

tions can mask critical dynamic effects that later cause problems during actual EVA's performed in space. Methods of formulating dynamic equations of motion for multibody systems are discussed with emphasis on Kane's method, which forms the basis of the simulations presented herein. Formulation of the equations of motion for a two degree of freedom arm is presented as an explicit example. The four basic steps in creating the computational simulations were: system description, in which the geometry, mass properties, and interconnection of system bodies are input to the computer; equation formulation based on the system description; inverse kinematics, in which the angles, velocities, and accelerations of joints are calculated for prescribed motion of the endpoint (hand) of the arm; and inverse dynamics, in which joint torques are calculated for a prescribed motion. A graphical animation and data plotting program, EVADS (EVA Dynamics Simulation), was developed and used to analyze the results of the simulations that were performed on a Silicon Graphics Indigo2 computer. EVA tasks involving manipulation of the Spartan 204 free flying astronomy payload, as performed during Space Shuttle mission STS-63 (February 1995), served as the subject for two dynamic simulations. An EVA crewmember was modeled as a seven segment system with an eighth segment representing the massive payload attached to the hand. For both simulations, the initial configuration of the lower body (trunk, upper leg, and lower leg) was a neutral microgravity posture. In the first simulation, the payload was manipulated around a circular trajectory of 0.15 m radius in 10 seconds. It was found that the wrist joint theoretically exceeded its ulnar deviation limit by as much as 49.8 deg and was required to exert torques as high as 26 N-m to accomplish the task, well in excess of the wrist physiological limit of 12 N-m. The largest torque in the first simulation, 52 N-m, occurred in the ankle joint. To avoid these problems, the second simulation placed the arm in a more comfortable initial position and the radius and speed of the circular trajectory were reduced by half. As a result, the joint angles and torques were reduced to values well within their physiological limits. In particular, the maximum wrist torque for the second simulation was only 3 N-m and the maximum ankle torque was only 6 N-m.

Author

Computerized Simulation; Dynamic Characteristics; Extravehicular Activity; Gravitational Effects; Human Factors Engineering; Microgravity; Physical Work;

N96-13562 Air Force Systems Command, Wright-Patterson AFB, OH. Armstrong Lab.

50 years of human engineering history and cumulative bibliography of the Fitts Human Engineering Division Report, 1945-1994

Green, Rebecca J.; Self, Herschel C.; and Ellifritt, Tanya S.; May 1995 290 p Limited Reproducibility: More than 20% of this document may be affected by poor print

Report No.(s): (AD-A295601; AL/CF-SR-1995-0007)
Avail: Issuing Activity (Defense Technical Information Center (DTIC))

This report depicts the Human Engineering Division's research and development efforts spanning the past half century. It is organized around a reference bibliography comprising technical reports, journal publications, conference proceedings, books and book chapters published between August 1945 and December 1994.

DTIC

Bibliographies; Histories; Human Factors Engineering;

N96-13581* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

Space suit sizing device Patent

Vykukal, Hubert C.; inventor (to NASA) 25 Apr. 1995
10 p Filed 5 Apr. 1993

Report No.(s): (NASA-CASE-ARC-11991-1; US-PATENT-5,409,331; US-PATENT-APPL-SN-053940; US-PATENT-CLASS-403-109; US-PATENT-CLASS-403-103; US-PATENT-CLASS-403-104; US-PATENT-CLASS-285-390; INT-PATENT-CLASS-F16B-7/10) Avail: US Patent and Trademark Office

A space suit sizing device using a ball nut and screw drive mechanism to shorten and lengthen components of a space suit. The device includes a rotatable member having an outer race formed on an inner surface thereof, and a translatable member having an inner race formed on an outer surface thereof. A plurality of recirculating balls are located in a space defined by the inner and outer races. As the rotatable member is rotated by hand, the translatable member is caused to move in and out of the rotatable member. Since one component of the space suit is connected to the translatable member, the length of this component varies in accordance with the position of the translatable member.

Author

Adjusting; Sizing; Space Suits; Spacecrews;

N96-13853*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

Space Station water degradation study covering the first 24 months of exposure

McRight, P. S.; and Roman, M. C.; Washington, DC, United States National Aeronautics and Space Administration 1 Sep. 1995 24 p

Report No.(s): (NASA-TM-108499; NAS 1.26:108499; NIPS-95-05296) Avail: CASI HC A03/MF A01

This report describes the MSFC space station water degradation study (WDS) and presents interim results from the first 24 months of testing. The WDS simulates the stagnant storage of water in distribution lines before the activation of the space station's water processor by storing processed water at ambient temperature in valved sections of 1-in stainless steel and titanium tube. The WDS seeks to

determine whether the water quality will degrade unacceptably and whether microbial growth will proceed to an unmanageable extent during extended stagnation. During the first 24 months, significant changes have occurred. Although iodine, which is used as a biocide, was nearly depleted within the first 6 months of testing, microbial growth has been minimal. This report describes the decrease in iodine concentration and the results of microbial and bio-film analyses. Increases in total organic carbon, iodide, chloride, nickel, iron, and chromium concentrations are presented and discussed. The observed increase in conductivity and the decreases in pH and turbidity are also presented. The authors conclude that, with proper preparation, potable water can be stored under stagnant conditions without unmanageable degradation in water quality; a flushing operation and subsequent processing of the degraded water should render the water system ready for use.

Author

Biodegradation; Microorganisms; Potable Water; Space Stations; Stainless Steels; Titanium; Water Quality;

N96-14041# Army Research Inst. of Environmental Medicine, Natick, MA.

Transient heat transfer through protective clothing at sea level and high altitude

Chang, S. K.; Santee, W. R.; Blanchard, L. A.; and Gonzalez, R. R.; Jul. 1995 38 p

Report No.(s): (AD-A297229) Avail: CASI HC A03/MF A01

Skin, clothing and dew point temperatures were measured on subjects walking and then resting on a treadmill, wearing U.S. Army BDU and BDO (MOPP 1). Sea level and a high altitude environment were tested. The altitude environment, comparable to the condition at terrestrial elevation of 4,570 m (15,000 ft) above sea level, was simulated in the U.S. Army Research Institute of Environmental Medicine (USARIEM) Hypobaric Chamber. For both environments, we found a marked increase in the weighted average clothing temperature, T_{ci} during the transient period immediately after the cessation of walking. The similarly weighted average skin temperature, T_{sk} , did not exhibit any corresponding change, thus eliminating a metabolic origin of the observed increase in T_{cl} . Moreover, since the same effect was found at both sea level and altitude, hypobarism also must not be a primary cause. A large release of heat stored within clothing is suggested as a source. When walking ceased, this stored heat, resident within the air mass between clothing layers, was driven outward by the large temperature gradient between skin and ambient temperatures. Other alternative mechanisms such as the pumping effect of clothing and the regain phenomenon were also examined and discussed.

DTIC

Clothing; Dew Point; Elevation; Heat Transfer; High Altitude;

tude; High Altitude Environments; Protective Clothing; Sea Level;

N96-14059# Litton Systems (Canada) Ltd., Rexdale (Ontario).

Variable transmittance visor development program Final Report, Jul. 1991 - Oct. 1994

Bahadur, Birenda; Young, Willard; Wan, Kam; and Lewis, David; Nov. 1994 70 p

Contract(s)/Grant(s): (F33615-91-C-0533)

Report No.(s): (AD-A297264; AL/CF-SR-1995-0003)

Avail: CASI HC A04/MF A01

The objective was to develop a technology for varying the transmittance of conventional flight helmet visors under electronic control for the purpose of enhancing the contrast of helmet mounted displays. The specifications required a 10:1 attenuation range with a clear-state transmittance of 70% or better and no visible coloration, haze, or optical distortion. Two technologies were studied: polymer dispersed liquid crystal (PDLC) and suspended particles. Several low birefringence PDLC's with neutral dye in a guest-host arrangement were tested; they produced excessive haze, apparently because their birefringence, although relatively low, was still too high for the project's purpose. The suspended-particle technology was tested in two forms: fluid and polymer-dispersed. Both forms showed a strong blue coloration in the dark state and neither proved to be compatible with conventional visors; instead, they must be sandwiched between mating halves of custom-built visors. Furthermore, over time, the fluid form developed streaks and dark spots; the polymer-dispersed form developed crazing lines and spatial nonuniformities. We conclude that the suspended-particle technology is not promising, but guest-host PDLC deserves further exploration if PDLC's having lower birefringence become available.

DTIC

Flight Clothing; Helmet Mounted Displays; Image Contrast; Liquid Crystals; Optical Materials; Solid Suspensions; Transmittance; Visors;

N96-14078*# ION Electronics, Huntsville, AL.

Special environmental control and life support equipment test analyses and hardware Final Report

Callahan, David M.; 1 Sep. 1995 66 p Original contains 1 color illustration

Contract(s)/Grant(s): (NAS8-38250)

Report No.(s): (NASA-CR-199201; NAS 1.26:199201; NIPS-95-05721) Avail: CASI HC A04/MF A01

This final report summarizes NAS8-38250 contract events, 'Special Environmental Control and Life Support Systems Test Analysis and Hardware'. This report is technical and includes programmatic development. Key to the success of this contract was the evaluation of Environmental Control and Life Support Systems (ECLSS) test results via

sophisticated laboratory analysis capabilities. The history of the contract, including all subcontracts, is followed by the support and development of each Task.

Derived from text

Environmental Control; Life Support Systems; Microbiology; Spaceborne Experiments;

55 SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

No abstracts in this category.



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Report Documentation Page

1. Report No. NASA SP-7011 (411)	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Aerospace Medicine and Biology A Continuing Bibliography (Supplement 411)		5. Report Date February 1996	6. Performing Organization Code JT
		8. Performing Organization Report No.	
7. Author(s)	10. Work Unit No.		11. Contract or Grant No.
9. Performing Organization Name and Address NASA Scientific and Technical Information Office		13. Type of Report and Period Covered Special Publication	
		14. Sponsoring Agency Code	
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, DC 20546-0001		15. Supplementary Notes	
16. Abstract This report lists 54 reports, articles and other documents recently announced in the NASA STI Database.			
17. Key Words (Suggested by Author(s)) Aerospace Medicine Bibliographies Biological Effects		18. Distribution Statement Unclassified – Unlimited Subject Category – 52	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 32	22. Price A03/HC

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