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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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❺ Contract(s)/Grant(s): RTOP 505-68-70-04
❻ Report No(s): NASA-TM-4663; NAS 1.15:4663; L-17418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
❼ To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free-stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10’ to 50’, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics; however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65’ swept forebody serrations tended to roll together, while vortices from 40’ swept serrations were more effective in generating additional lift caused by their more independent nature.
❽ Author
❾ *Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations*

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AEROSPACE MEDICINE AND BIOLOGY

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LIFE SCIENCES (GENERAL)

19970008572

Comparison of the effects of absorption coefficient and pulse duration of 2.12- micron and 2.79- micron radiation on laser ablation of tissue

Frenz, Martin, Univ of Berne, Switzerland; Pratisto, Hans; Koenz, Flurin; Jansen, E. Duco; Welch, Ashley J.; Weber, Heinz P.; IEEE Journal of Quantum Electronics; December 1996; ISSN 0018-9197; 32, 12, pp. 2025-2036; In English; Copyright; Avail: Issuing Activity

The basic physical mechanisms underlying tissue ablation and the laser-induced tissue effects using pulsed Er:YSGG (2.79 micron) and Ho:YAG (2.12 micron) laser radiation are presented and compared. In vitro tissue effects, ablation depth, and extent of tissue damage on meniscus treated under water and on cornea treated in air were investigated and examined histologically. Er:YSGG radiation, due to its 100 times higher absorption than Ho:YAG radiation, exhibited a high tissue ablation efficiency with a relatively small zone of coagulated tissue (Q-switched 4-10 micron free-running less than 100 micron), whereas the coagulated tissue zone was 300-1000 micron after free-running and 100-120 micron after Q-switched Ho:YAG laser impact.

Author (EI)

Electromagnetic Interactions; Laser Ablation; Lasers; Medical Services; Pulse Duration; Pulsed Lasers; Surgery

19970008876

Bioconvection in a suspension of phototactic algae

Vincent, R. V., Univ of Leeds, UK; Hill, N. A.; Journal of Fluid Mechanics; November 25 1996; ISSN 0022-1120, pp. 343-371; In English; Copyright; Avail: Issuing Activity

A generic model for phototaxis in a suspension of microscopic swimming algae is presented. The model incorporates the effect of shading whereby microorganisms nearer the light source absorb and scatter the light before it reaches those farther away. The model is used to analyze the linear stability of a suspension of phototactic algae that swim in a fluid which is slightly less dense than they are. The behavior of the suspension is characterized by four parameters: a layer depth parameter, a Rayleigh number, a Schmidt number, and a sublayer position parameter that specifies the vertical position of the sublayer in the fluid. The initial pattern wavelengths and the critical Rayleigh number are affected by the position of the sublayer.

Author (EI)

Algae; Mathematical Models; Rayleigh Number; Schmidt Number; Suspending (Mixing)

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AEROSPACE MEDICINE

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

19970005623 Walter Reed Army Medical Center, Washington, DC USA

Stress and Immune Function: Regulation of Adrenergic Receptors in Human B Lymphocytes ***Final Report, 1 May 1995 - 30 Apr. 1996***

Tsokos, George C., Walter Reed Army Medical Center, USA; May 1996; 15p; In English

Contract(s)/Grant(s): MIPR-95MM5621

Report No.(s): AD-A313736; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

During the previous year we have investigated the effects of interleukin-1 (IL-1) and interleukin-6 (IL-6) on the density and function of beta to 2 adrenergic receptor (AR) protein and steady state mRNA levels in human lymphoblastoid cell lines. We established a DNA-excess solution hybridization assay using M13-beta-2AR (III) template DNA. This assay helped us detect small changes in the message for beta-2AR. We treated Epstein-Barr (EB) virus transformed human B lymphoblastoid cells and an antibody-secreting lymphoblastoid cell line (IM9) with IL-1 and IL-6. Treatment of the cells with the cytokines caused a marked decrease in the density of beta-2AR but failed to change the affinity of the receptors for the ligand. In contrast, treatment of B cells with both cytokines resulted in increase in the beta-2AR message in both cell lines. to investigate the discrepancy between the effect of lymphokines on receptor protein and its message, we conducted a transcription experiment by using nuclear run-off assays in which we demonstrated that lymphokines increase the stability of the mRNA for beta-2AR. These results demonstrate that lymphokines may alter the expression of stress receptors in human lymphocytes. We conclude that stress receptors interact at the molecular level with elements of the immune system.
DTIC
Stress Functions; Immune Systems; Lymphocytes; Steady State; Sympathetic Nervous System; Deoxyribonucleic Acid; Adrenergics; Antibodies

19970008128 NASA Ames Research Center, Moffett Field, CA USA
Pharmacologic Atrial Natriuretic Peptide Reduces Human Leg Capillary Filtration
Watenpaugh, Donald E., NASA Ames Research Center, USA; Vissing, Susanne F., Texas Univ., USA; Lane, Lynda D., Texas Univ., USA; Buckey, Jay C., Texas Univ., USA; Firth, Brian G., Texas Univ., USA; Erdman, William, Texas Univ., USA; Hargens, Alan R., NASA Ames Research Center, USA; Blomqvist, C. Gunnar, NASA Ames Research Center, USA; Journal of Cardiovascular Pharmacology; 1995; Volume 26, pp. 414-419; In English
Contract(s)/Grant(s): NAS9-16044; NAG9-267; NGT-50206; DMRC-12-6945; DMRC-12-7663
Report No.(s): NASA-CR-203218; NAS 1.26:203218; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

Atrial natriuretic peptide (ANP) is produced and secreted by atrial cells. We measured calf capillary filtration rate with prolonged venous-occlusion plethys-mography of supine health male subjects during pharmacologic infusion of ANP (48 pmol/kg/min for 15 min; n equals 6) and during placebo infusion (n equals 7). Results during infusions were compared to prior control measurements. ANP infusion increased plasma (ANP) from 30 plus or minus 4 to 2,568 plus or minus 595 pmol/L. Systemic hemoconcentration occurred during ANP infusion; mean hematocrit and plasma colloid osmotic pressure increased 4.6 and 11.3 percent respectively, relative to pre-infusion baseline values (p is less than 0.05). Mean calf filtration, however was significantly reduced from 0.15 to 0.08 ml/100 ml/min with ANP. Heart rate increased 20 percent with ANP infusion, wheras blood pressure was unchanged. Calf conductance (blood flow/arterial pressure) and venous compliance were unaffected by ANP infusion. Placebo infusion had no effect relative to prior baseline control measurements. Although ANP induced systemic capillary filtration, in the calf, filtration was reduced with ANP. Therefore, phamacologic ANP infusion enhances capillary filtration from the systemic circulation, perhaps at upper body or splanchic sites or both, while having the opposite effect in the leg.
Author
Arteries; Peptides; Blood Pressure; Heart Rate; Circulatory System; Leg (Anatomy); Capillary Flow

53
BEHAVIORAL SCIENCES

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

19970007197 Institute for Human Factors TNO, Soesterberg, Netherlands
Human Performance in a Moving Environment *Interim Report Werken in een bewegende omgeving*
Wertheim, A. H., Institute for Human Factors TNO, Netherlands; Dec. 20, 1996; 26p; In English
Contract(s)/Grant(s): A95/KM/359
Report No.(s): TD-96-0505; TNO-TM-96-A063; Copyright; Avail: Issuing Activity (TNO Human Factors Research Institute, Kampweg 5, PO Box 23, 3769 ZG Soesterberg, The Netherlands), Hardcopy, Microfiche

This paper presents a review of what is currently known about the nature of human performance in moving environments (both in simulators and in real environments) based on research carried out over the last ten years at the TNO Human Factors Research Institute. It is argued that performance decrements can be expected as a result of general factors or as a result of specific impairments of particular human skills. General effects happen when environmental motion reduces motivation , increases fatigue, or creates balance problems. Specific effects of moving environments on task performance may only be expected through

bio-mechanical influences on particular skills like perception, or motor skills. There is no direct evidence for direct effects of motion on purely cognitive skills.
Derived from text
Human Factors Engineering; Human Performance; Sensorimotor Performance; Information Processing (Biology); Cognition; Motion

19970007623 Institute for Human Factors TNO, Soesterberg, Netherlands
Image Fusion Improves Situational Awareness
Toet, A., Institute for Human Factors TNO, Netherlands; Ijspeert, J. K., Institute for Human Factors TNO, Netherlands; vanDorresteijn, M. J., Institute for Human Factors TNO, Netherlands; Oct. 31, 1996; 28p; In English; Original contains color illustrations
Contract(s)/Grant(s): A96/KL/347
Report No.(s): TM-96-A051; Copyright; Avail: Issuing Activity(TNO, Kampweg 5, PO Box 23, 3769 ZG Soesterberg, The Netherlands), Hardcopy, Microfiche

Two recently developed false colour image fusion techniques, the TNO fusion scheme and the MIT fusion scheme, are applied to visual and thermal images of military relevant scenario's. The scenes represent 3 different scenario's that simulate military surveillance tasks. The images are registered around sunrise. At this time, the contrast in both image modalities is low. The thermal images clearly depict objects with large temperature contrast like persons, but they do not correctly represent the spatial context. The composite images produced by both fusion schemes clearly represent all details in their correct spatial context. An observer experiment is performed to test if the increased amount of detail in the fused images can yield an improved observer performance in a task that requires a certain amount of situational awareness. The task that is devised involves the localization of a person in the displayed scene relative to some characteristic details that provide the spatial context. The results show that observers can indeed determine the relative location of a person in a scene with a significantly higher accuracy when they perform with fused images, compared to the individual image modalities. The MIT colour fusion scheme yields the best overall performance (i.e. an accuracy that is significantly higher than that obtained with images fused according to the TNO scheme and with the original images). Even the most simple (TNO) fusion scheme yields an observer performance that is better than that obtained for the individual (thermal and visual) images.
Derived from text
Image Processing; Color; Imaging Techniques

19970007778 Institute for Human Factors TNO, Soesterberg, Netherlands
Quantifing the Image Quality of the KDC-10 Refueling System ***Final Report***
Kooi, F. L., Institute for Human Factors TNO, Netherlands; van Breda, L., Institute for Human Factors TNO, Netherlands; Dec. 04, 1996; 22p; In English
Contract(s)/Grant(s): A96/KLu/341
Report No.(s): RP-96-0195; TM-96-A052; Copyright; Avail: Issuing Activity (Inst. for Human Factors Research TNO, Soesterberg, Netherlands), Hardcopy, Microfiche

The image quality of the KDC-10 refuelling vision system has been evaluated in terms of resolution and contrast sensitivity. to this aim a new contrast test was developed. A comparison to other systems shows that the KDC-10 refuelling vision system is particularly lacking in its contrast representation. A recent adjustment to the system partially improved its characteristics. Part of the poor contrast representation is due to the incomplete image separation of the stereoscopic screen. On the basis of a quantitative analysis of the image quality recommendations for further improvement are given.
Derived from text
Image Contrast; Image Resolution; Air to Air Refueling

19970008129 NASA Ames Research Center, Moffett Field, CA USA
Combining Speed Information Across Space
Verghese, Preeti, NASA Ames Research Center, USA; Stone, Leland S., NASA Ames Research Center, USA; Vision Res.; 1995; ISSN 0042-6989; Volume 35, No. 20, pp. 2811-2823; In English
Contract(s)/Grant(s): RTOP 199-16-12-37
Report No.(s): NASA-TM-111845; NAS 1.15:111845; ISBN-00038-0; Copyright Waived (NASA); Avail: CASI; A03, Hardcopy; A01, Microfiche

We used speed discrimination tasks to measure the ability of observers to combine speed information from multiple stimuli distributed across space. We compared speed discrimination thresholds in a classical discrimination paradigm to those in an uncertainty/search paradigm. Thresholds were measured using a temporal two-interval forced-choice design. In the discrimination par-

adigm, the n gratings in each interval all moved at the same speed and observers were asked to choose the interval with the faster gratings. Discrimination thresholds for this paradigm decreased as the number of gratings increased. This decrease was not due to increasing the effective stimulus area as a control experiment that increased the area of a single grating did not show a similar improvement in thresholds. Adding independent speed noise to each of the n gratings caused thresholds to decrease at a rate similar to the original no-noise case, consistent with observers combining an independent sample of speed from each grating in both the added- and no-noise cases. In the search paradigm, observers were asked to choose the interval in which one of the n gratings moved faster. Thresholds in this case increased with the number of gratings, behavior traditionally attributed to an input bottleneck. However, results from the discrimination paradigm showed that the increase was not due to observers' inability to process these gratings. We have also shown that the opposite trends of the data in the two paradigms can be predicted by a decision theory model that combines independent samples of speed information across space. This demonstrates that models typically used in classical detection and discrimination paradigms are also applicable to search paradigms. As our model does not distinguish between samples in space and time, it predicts that discrimination performance should be the same regardless of whether the gratings are presented in two spatial intervals or two temporal intervals. Our last experiment largely confirmed this prediction.
Author
Psychological Factors; Psychological Tests; Stimuli; Human Performance; Information Processing (Biology)

19970008372 Institute for Human Factors TNO, Soesterberg, Netherlands
Systematic Development of Team Training: A Review of the Literature ***Interim Report Systematisch Ontwikkelen van Team Training: Een Literatuurstudie***
vanBerlo, M. P., Institute for Human Factors TNO, Netherlands; Jun. 13, 1996; 41p; In English
Report No.(s): AD-A311731; TNO-TM-96-B010; TDCK-RP-96-0159; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A major drawback in the process of developing team training systems is that most methodologies and guidelines for developing training systems are aimed at the individual trainee. A coherent methodology for developing team training systems is still tacking. Consequently, developers of team training systems must often resort to the use of recommendations and guidelines geared to the development of individual-centered training systems. However, these may be insufficient given the different nature and characteristics of teams and team performance. Related to this point is the fact that, regarding complex learning environments developed for team training, it is often not clear which, and how, instructional principles should be applied to actually train the team. In this report, the concept of team performance is being defined (chapter 2), preceded by an introduction in the first chapter. Chapter 3 concisely describes the four phases of instructional systems development viz analysis, design, implementation and evaluation. Based on these generic phases, in chapter 4 an overview is presented of various guidelines for developing team training as described in the literature. These guidelines (each referring to only some of the phases of instructional systems development) are being described and evaluated. On the basis of this review of the literature an inventory has been made regarding the aspects of team training development that remain to be analyzed (chapter 5). Finally, in chapter 6, the direction of future research is indicated.
DTIC
Human Factors Engineering; Human Performance; Systems Engineering

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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.

19970008012 Army Aeromedical Research Lab., Fort Rucker, AL USA
Counterweights Used with ANVIS ***Final Report***
McLean, Bill, Army Aeromedical Research Lab., USA; Shannon, Samuel, Army Aeromedical Research Lab., USA; McEntire, Joe, Army Aeromedical Research Lab., USA; Armstrong, Scott, Army Aeromedical Research Lab., USA; Jul. 1996; 27p; In English
Contract(s)/Grant(s): DA Proj. 3M1-62787-A-879
Report No.(s): AD-A311728; USAARL-96-30; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A survey was conducted at Fort Rucker, Alabama, on the use of counterweights with the aviator night vision imaging system (ANVIS). The purposes of the survey were to determine frequency and purpose of counterweight use, materials used, and actual weight of the counterweights. Thirty-seven night vision goggle (NVG) instructor pilots (IPs) and nineteen NVG student pilots

contributed to this survey. NVG participants flew four different aircraft types located at three different airfields. The results showed that 76 percent of the NVG IPs used counterweights. Average weight for the counterweights was 13 oz with a minimum of 8.9 and a maximum of 22 oz. For the graduating NVG student pilots, 100 percent used counterweights. The average counterweight used by the students was 11.7 oz with a minimum of 3.4 and a maximum of 20.1 oz. The two primary reasons listed for using counterweights were to reduce the helmet from rotating forward and to relieve neck strain. The most common type of counterweight consisted of a standard issued cloth bag with two to three rolls of pennies. In the heaviest possible configuration, the head supported weight with ANVIS could be as much as 7.3 pounds lbs, which includes an X-Large SPH-4 helmet, 25-mm eyepiece ANVIS with dual battery pack and AA batteries, 20 oz of counterweight, a lip light, and an ANVIS head-up diay (HUD). of the 37 NVG IPs surveyed, the average estimated head supported weight with ANVIS was 4.7 lbs, with a minimum of 4.7 and a maximum of 6.8 lbs. With the addition of a protective mask the total weight would increase by approximately 2 pounds.
DTIC

Aircraft Pilots; Night Vision; Pilot Performance; Night Flights (Aircraft); Dark Adaptation

Subject Term Index

Personal Author Index

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