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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Typical Report Citation and Abstract

❶ **19970001126** NASA Langley Research Center, Hampton, VA USA
❷ **Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes**
❸ Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA;
❹ Mar. 1996; 130p; In English
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

A Continuing Bibliography (Suppl. 479)

NOVEMBER 30, 1998

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AEROSPACE MEDICINE

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

19980227853 NASA Ames Research Center, Moffett Field, CA USA

Physiological Effects of Acceleration Observed During a Centrifuge Study of Pilot Performance

Smedal, Harald A., NASA Ames Research Center, USA; Creer, Brent Y., NASA Ames Research Center, USA; Wingrove, Rodney C., NASA Ames Research Center, USA; Journal of Aerospace Medicine; Dec. 1960; Volume 31, No. 11, pp. 901-906; In English, 5-11 May 1960, Miami Beach, FL, USA

Report No.(s): NASA-TN-D-345; A-453; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

An investigation was conducted by the National Aeronautics and Space Administration, Ames Research Center, and the Naval Air Development Center, Aviation Medical Acceleration Laboratory, to study the effects of acceleration on pilot performance and to obtain some meaningful data for use in establishing tolerance to acceleration levels. The flight simulator used in the study was the Johnsville centrifuge operated as a closed loop system. The pilot was required to perform a control task in various sustained acceleration fields typical of those that Might be encountered by a pilot flying an entry vehicle in which he is seated in a forward-facing position. A special restraint system was developed and designed to increase the pilot's tolerance to these accelerations. The results of this study demonstrated that a well-trained subject, such as a test pilot, can adequately carry out a control task during moderately high accelerations for prolonged periods of time. The maximum levels of acceleration tolerated were approximately 6 times that of gravity for approximately 6 minutes, and varied slightly with the acceleration direction. The tolerance runs were in each case terminated by the subject. In all but two instances, the cause was extreme fatigue. On two occasions the subject terminated the run when he "grayed out." Although there were subjective and objective findings involving the visual and cardiovascular systems, the respiratory system yielded the more critical limiting factors. It would appear that these limiting factors were less severe during the "eyeballs-out" accelerations when compared with the "eyeballs-in" accelerations. These findings are explained on the basis of the influence that the inertial forces of acceleration have on the mechanics of respiration. A condensed version of this report was presented at the Annual Meeting of the Aerospace Medical Association, Miami Beach, May 5-11, 1960, in a paper entitled "Ability of Pilots to Perform a Control Task in Various Sustained Acceleration Fields."

Author

Physiological Effects; Pilot Performance; Aerospace Medicine; NASA Programs; Flight Simulators; Feedback Control; Centrifuges

19980228043 NASA Lewis Research Center, Cleveland, OH USA

Human Tolerance to Rapidly Applied Accelerations: A Summary of the Literature

Eiband, A. Martin, NASA Lewis Research Center, USA; Jun. 1959; 100p; In English

Report No.(s): NASA-MEMO-5-19-59E; E-345; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche

The literature is surveyed to determine human tolerance to rapidly applied accelerations. Pertinent human and animal experiments applicable to space flight and to crash impact forces are analyzed and discussed. These data are compared and presented on the basis of a trapezoidal pulse. The effects of body restraint and of acceleration direction, onset rate, and plateau duration on the maximum tolerable and survivable rapidly applied accelerations are shown. Results of the survey indicate that adequate torso and extremity restraint is the primary variable in tolerance to rapidly applied accelerations. The harness, or restraint system, must be arranged to transmit the major portion of the accelerating force directly to the pelvic structure and not via the vertebral column. When the conditions of adequate restraint have been met, then the other variables, direction, magnitude, and onset rate of rapidly applied accelerations, govern maximum tolerance and injury limits. The results also indicate that adequately stressed aft-faced passenger seats offer maximum complete body support with minimum objectionable harnessing. Such a seat, whether designed

for 20-, 30-, or 40-G dynamic loading, would include lap strap, chest (axillary) strap, and winged-back seat to increase headward and lateral G protection, full-height integral head rest, arm rests (load-bearing) with recessed hand-holds and provisions to prevent arms from slipping either laterally or beyond the seat back, and leg support to keep the legs from being wedged under the seat. For crew members and others whose duties require forward-facing seats, maximum complete body support requires lap, shoulder, and thigh straps, lap-belt tie-down strap, and full-height seat back with integral head support.
Author
Human Tolerances; Acceleration Tolerance; Human Factors Engineering; Acceleration Stresses (Physiology); High Acceleration; Physiological Effects

19980228295 NASA Langley Research Center, Hampton, VA USA
Aerospace Medicine and Biology: A Continuing Bibliography with Indexes, Supplement 477
Nov. 02, 1998; 21p; In English
Report No.(s): NASA/SP-1998-7011/SUPPL477; NAS 1.21:7011/SUPPL477; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This supplemental issue of Aerospace Medicine and Biology, A Continuing Bibliography with Indexes (NASA/SP-1998-7011) lists 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.
CASI
Aerospace Medicine; Bibliographies; Indexes (Documentation); Bioastronautics; Exobiology; Biological Effects

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BEHAVIORAL SCIENCES

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

19980227998 NASA Langley Research Center, Hampton, VA USA
Analytical and Preliminary Simulation Study of a Pilot's Ability to Control the Terminal Phase of a Rendezvous with Simple Optical Devices and a Timer
Lineberry, Edgar C., Jr., NASA Langley Research Center, USA; Brissenden, Roy F., NASA Langley Research Center, USA; Kurbjun, Max C., NASA Langley Research Center, USA; Oct. 1961; 26p; In English
Report No.(s): NASA-TN-D-965; L-1697; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

One method of controlling the terminal phase of a space rendezvous between two vehicles is first to correct the flight path of the controlled vehicle so that a constant line of sight is established between the vehicles. This correction is accomplished by thrusting normal to the sight line in a direction to arrest the angular motion of this line. Once this collision course has been established, the second step is to control the closure rate for a safe approach along the line of sight. Adequate control of this maneuver requires range and closure-rate information. A combined analytical and preliminary simulation study was conducted to determine the ability of a human pilot to control the rendezvous by this method using visual sightings made during the initial collision-course control to obtain the range and closure rate. The analytical phase of the study reviewed the geometric relations between the vehicles and formed the basis for techniques to transform the angular sightings into range and closure rate. A preliminary simulation was then made to investigate the accuracy of these techniques. The simulation consisted of an analog computer, an oscilloscope to represent the view a pilot would have-with a stabilized sight, and a timer. Results indicate that pilots, using an optical sight and a timer, can successfully arrest the angular motion of the line of sight between two rendezvous vehicles and obtain relative range and closure rate with sufficient accuracy to perform the final braking maneuver successfully.
Author
Flight Paths; Space Rendezvous; Pilot Performance; Optical Equipment

19980228381 National Defence Research Establishment, Avdelningen foer Humanvetenskap, Stockholm, Sweden

Information Transmission from Behavioral Human-System Perspective ***Informationsoeverfoering i ett Beteendevetenskapligt Maenniska-System Perspektiv***

Linde, L., National Defence Research Establishment, Sweden; 1998; 52p; In Swedish

Report No.(s): PB98-168701; FOA-R-97-00500-503-SE; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Behavior literature pertinent to information transmission in human-machine systems is surveyed. The following areas are treated. (1) Information properties that may affect transmission and cognitive load; (2) Type of concurrent information channels and their combination; (3) Information load in a narrow and wide sense; (4) Human information processing; (5) Information processing under stress; (6) Some psychophysiological aspects of cognitive and mental load are mentioned; (7) Information transmission and analysis of operator-aviation systems. Different control principles for behavior in dynamic decision-making situations in general are described. It is stressed that control behavior can be directed both towards the environment and the own body (e.g. emotions). Different control loops in a human-computer-aviation system are mentioned. The distinction between integrated and focused tasks and some experimental results pertinent to principles for presentation of symbolic information are accounted for. NTIS

Information; Data Transmission; Human Performance; Man Machine Systems; Information Processing (Biology); Perception

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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.

19980228135 NASA Ames Research Center, Moffett Field, CA USA

A Pilot Opinion Study of Lateral Control Requirements for Fighter-Type Aircraft

Creer, Brent Y., NASA Ames Research Center, USA; Stewart, John D., NASA Ames Research Center, USA; Merrick, Robert B., NASA Ames Research Center, USA; Drinkwater, Fred J., III, NASA Ames Research Center, USA; Mar. 1959; 46p; In English

Report No.(s): NASA-MEMO-1-29-59A; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

As part of a continuing NASA program of research on airplane handling qualities, a pilot opinion investigation has been made on the lateral control requirements of fighter aircraft flying in their combat speed range. The investigation was carried out using a stationary flight simulator and a moving flight simulator, and the flight simulator results were supplemented by research tests in actual flight. The flight simulator study was based on the presumption that the pilot rates the roll control of an airplane primarily on a single-degree-of-freedom basis; that is, control of angle of roll about the aircraft body axis being of first importance. From the assumption of a single degree of freedom system it follows that there are two fundamental parameters which govern the airplane roll response, namely the roll damping expressed as a time constant and roll control power in terms of roll acceleration. The simulator study resulted in a criterion in terms of these two parameters which defines satisfactory, unsatisfactory, and unacceptable roll performance from a pilot opinion standpoint. The moving simulator results were substantiated by the in-flight investigation. The derived criterion was compared with the roll performance criterion based upon wing tip helix angle and also with other roll performance concepts which currently influence the roll performance design of military fighter aircraft flying in their combat speed range.

Author

Research; Controllability; Criteria; Lateral Control; Human Reactions; Pilots (Personnel)

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