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One More Time—An Aerospace Vehicle

FOR several decades we have witnessed, both in the United States and abroad, attempts to develop an aerospacecraft having both aircraft-like and spacecraft-like capability. Although these attempts did not achieve the vehicle, they did develop new technology that has taken us markedly closer to that goal in most of the difficult disciplines. Once again, as this millennium closes out, we begin to see phrases like "Access to Space" coming from NASA as one of its "Three Pillars for Success," and "Migration to Space" and "Seamless Aerospace Operations" coming from the Air Force. A principal target of all this, once again, is the development of an aerospace vehicle. The emphasis will be on fully exploiting the integration of aeronautical technology with launch vehicle technology to achieve an affordable solution. NASA envisions as much as a ten-fold reduction in the cost of placing payloads in low-Earth orbit by the end of the next decade, followed by another ten-fold reduction in the decade to follow. The commercial and military potential of such an achievement is obvious. Several major programs are now in place to demonstrate portions of the solution. Much of the technology development will find its way into this journal. When authors decide to which of the journals of AIAA they should submit their papers, they should check the scope statements of each journal. As a matter of further clarification, the *Journal of Aircraft* will publish papers dealing with the aircraft aspects of an aerospace vehicle. This would include such issues as design, aerodynamics, applied control, structures, subsystems, ground test, flight test, simulation, and operations within the atmosphere. I look forward to reviewing your best contributions in this challenging and rewarding endeavor.

Other new technology developments to look for early in the next decade include: high-performance uninhabited vehicles, major life extension of aging fleets, cost as a full-fledged performance requirement, and "Global Civil Aviation" (another NASA Pillar). Emphasis will be placed on dramatic improvements in aircraft safety driven by the rapidly expanding air travel market. To contain cost, much attention will be given to "virtual prototyping." Much more emphasis will be placed on modeling and simulation vs the usual hardware prototyping. Look also to a greater-than-normal emphasis on national (government/industry/academia) teaming on the larger S&T programs. Papers on the processes as well as the products of these endeavors will be welcome.

We have experienced several occasions where non-U.S. authors needed some extra help with paper preparation, sometimes due to language difficulties. This is one of the reasons we have an International Board of Editors representing most of the countries with sustained contributions to this journal. Board members appear on the inside front cover. Please contact them with any questions regarding publication. To facilitate this, I have initiated a letter to authors upon receipt of international submittals, as suggested by Dr. Nagabhushan, my Associate Editor (AE) for International Editors. This letter provides the address of the author's International Editor and suggests early contact to assist with any procedural matters.

The Aircraft Design Technical Committee has worked diligently during 1998 to locate an AE for design papers, a first for this journal. I would like to express my appreciation for their hard work, especially since it was rewarded with success. This Technical Committee (TC) located Dr. Conrad Newberry of the Naval Postgraduate School, a long-time acquaintance of mine and someone who will ensure that only the best, archival-quality design papers appear in the journal. Welcome to the editorial staff Conrad!

Another major step for this journal is the addition of an AE from The Netherlands. The advent of e-mail and relatively shorter international hard copy mail times has enabled adding international AEs to the staff. I would like to welcome Prof.dr.ir. H. W. M. Hoeijmakers to our AE staff. Dr. Hoeijmakers was recruited to the staff by Dr. Martin Beyers, our first international editor from Canada. He will handle papers in aerodynamics, replacing Dr. Luckring of NASA Langley Research Center, who retired as AE for aerodynamics last year.

I customarily complete my annual editorials with special recognition for all the folks, both volunteer and professional, who make this journal possible. Beginning with the volunteers, at the top of my most valuable supporters' list are the fine AEs appearing as the "1999 Team." These people serve with high dedication to help you transform your manuscripts into archival papers.

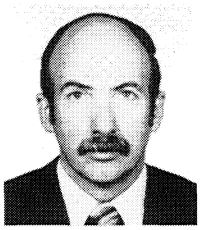
I formed our Editorial Advisory Board in 1993 to help better link the *Journal of Aircraft* to the appropriate AIAA TCs. This Board is made up of members of several AIAA TCs. They help represent journal publication at their TC meetings as well as encourage journal publication of good meetings papers. Some of these Board members serve as Publications Committee Members on their respective TCs. Over the past several years, they have helped identify "Best Papers" from technical sessions, which are identified to me and placed on a fast track. My thanks to the members of the Editorial Advisory Board.

We publish the names of the past year's reviewers, through mid-October, in this issue. You will, of course, recognize many of these individuals. I thank them for providing the technical insight to ensure the published paper is accurate, timely, and important to the readers, and will have lasting value. Authors of declined papers are provided with good feedback on ways to improve future offerings. This journal would not exist without dedicated peer reviewers.

Turning to the professional staff, Norma Brennan is the AIAA Director of Publications. She ably directs all journal activity in AIAA along with other publication activity. She always finds time to answer my questions and provides encouragement to me and the AEs. Linda Wilson served very capably as Managing Editor over most of last year, but has moved on to new things. Brian Haefs, our new Managing Editor, is highly capable and excellent to work with. He came up from his previous position as Production Specialist. Serving capably in that position now is Jennifer Stover.

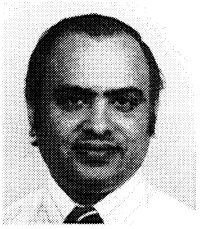
Thomas M. Weeks
Editor-in-Chief

Editor-in-Chief



THOMAS M. WEEKS completed his degree work at Syracuse University, Department of Mechanical and Aerospace Engineering, in 1965. He entered active commissioned service that year, assigned to the Air Force Flight Dynamics Laboratory (now the Air Vehicles Directorate of the Air Force Research Laboratory) at Wright–Patterson AFB, Ohio. His initial work was in the field of electrogasdynamics at the nearly completed 50 MW wind tunnel facility. In 1968, he separated from the Air Force but took a civil position at the same location. He worked on a variety of projects, including unsteady hypersonic heating, transonic test techniques, and sonic boom before becoming the Manager of the External Aerodynamics Group. He served first as the Deputy and then the Manager of the DARPA/NASA/USAF X-29 Advanced Technology Demonstrator. He served as Chief of the Wind Tunnels Branch and of the Technology Strategy Branch. He served as Acting Chief Scientist and Acting Deputy Director of the Directorate. He served as the Chief of the Integration and Operations Division. He retired from the Air Vehicles Directorate in August of 1988 and has taken a part time position as a Senior Scientist at the Ball Aerospace Technology Corporation in Fairborn, Ohio.

Associate Editors



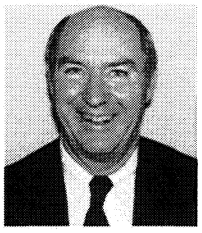
INDERJIT CHOPRA is an Alfred Gessow Rotorcraft Professor in Aerospace Engineering and Director of the Alfred Gessow Rotorcraft Center at the University of Maryland. Also, he has been a Minta-Martin Research Professor since 1996. He received a B.Sc. in Engineering from Punjab Engineering College, Chandigarh, India, in 1965, an M.E. from Indian Institute of Science, Bangalore, India, in 1968, and a Sc.D. from the Massachusetts Institute of Technology (MIT) in 1977. He worked at the National Aeronautical Laboratory in Bangalore from 1966 to 1974. His research there included aeroelastic analysis and wind-tunnel testing of scaled models of airplanes and launch vehicles. At MIT, he worked on dynamic analysis of wind turbines. In 1977, he joined NASA Ames/Stanford University Joint Institute of Aeronautics and Acoustics, where he worked for four and a half years on the development of aeroelastic analysis of advanced rotor systems and testing of full-scale helicopters in the NASA Ames 40 × 80-ft wind tunnel. In 1981, he joined the University of Maryland. He has been working on problems associated with aeromechanics of helicopter and smart structures, including aeromechanical stability, active vibration control, modeling of composite rotors, rotor head health monitoring, aeroelastic optimization, smart rotor development, and comprehensive analyses of bearingless, tilt-rotor, servo-flap, teetering and circulation control rotors. His graduate advising resulted in 24 Ph.D and 50 M.S. degrees. An author of over 160 articles and papers, Dr. Chopra has been an Associate Editor of the *Journal of the American Helicopter Society* (1987–91), and *Journal of Intelligent Materials and Systems* (1977–cont.). Also, he has been a member of the editorial advisory board of three journals, *Vertica* (1987–91), *Smart Materials and Structures* (1994–cont.), and *SADHANA* (1991–95). He is a member of the Army Science Board and a Fellow of AIAA, the American Helicopter Society, and the Aeronautical Society of India.

ROBERT E. DUFFY is currently president of RED Associates, a recently formed research and consulting firm. A former member of the faculty of the Department of Mechanical Engineering, Aeronautical Engineering, and Mechanics at Rensselaer Polytechnic Institute, he was for a number of years the chairman of the aeronautical engineering academic program. He is the author of over 50 published papers and research reports in the areas of applied aerodynamics, flight mechanics, and experimental fluid dynamics. Dr. Duffy has served as a consultant to numerous governmental agencies, industrial concerns, and individuals. He is a past member of the Atmospheric Flight Mechanics Technical Committee and is an Associate Fellow of AIAA.

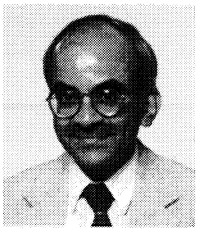
FRANKLIN E. EASTEP is a Professor of Aerospace Engineering at the University of Dayton. He received a B.S. from Ohio State University in 1958, an M.S. in Aeronautical Engineering from the Air Force Institute of Technology in 1963, and a Ph.D. in Aeronautics and Astronautics from Stanford University in 1968. Dr. Eastep has been teaching and conducting research within the technical areas of structural dynamics, aeroelasticity, and unsteady aerodynamics since 1968. During this period, he has been the principal thesis advisor for 15 doctoral students and over 35 master's students. He served on active duty with the U.S. Air Force for 20 years, retiring in 1978. Dr. Eastep is a member of the American Academy of Mechanics and an Associate Fellow of AIAA.

RONALD A. HESS received his B.S., M.S., and Ph.D. degrees in Aerospace Engineering from the University of Cincinnati. After completing his doctoral work, he joined the faculty of the Department of Aeronautics at the U.S. Naval Postgraduate School in Monterey, California. In 1976, he took a position at the Flight Systems Research Division at NASA Ames Research Center. In 1982, he joined the faculty at the University of California, Davis, where he is currently a Professor in the Department of Mechanical and Aeronautical Engineering. Dr. Hess' research interests lie in the areas of automatic and manual control of aircraft and in human/machine systems. He is an Associate Fellow of AIAA, a Senior Member of IEEE, and a member of Sigma Xi and Tau Beta Pi. He is also an Associate Editor of the *IEEE Transactions on Systems, Man, and Cybernetics.*

HENDRIK (HARRY) W. M. HOEIJMAKERS holds the Chair of Engineering Fluid Dynamics in the Department of Mechanical Engineering of the University of Twente in Enschede, The Netherlands. He received his M.Sc. degree in Aeronautical Engineering from Delft University of Technology in Delft, The Netherlands, in 1971. Within the framework of the NASA International University Fellowship he got the Aeronautical Engineer's degree from California Institute of Technology in Pasadena, California, in 1974. In 1974 he joined the National Aerospace Laboratory (NLR) in Amsterdam, The Netherlands. Here he worked in the Department of Theoretical Aerodynamics on the development and application of computational aerodynamics methods, ranging from panel methods for complex configurations in subsonic/supersonic flows to Euler and Navier–Stokes methods. The emphasis in the field of application was on vortical type of flows. While employed at NLR, he received his Ph.D. degree from Delft University of Technology in 1989 on the thesis, Computational Aerodynamics of Ordered Vortex Flows. At NLR he was involved in a number of international research cooperation projects and in leading the technical coordination group of an international project in the field of CFD for combat aircraft aerodynamics. In 1990, he was appointed to part-time Professor in Computational Physics at the Department of Applied Physics at Eindhoven University of Technology, Eindhoven, The Netherlands. His last position at NLR was that of deputy head of the Department of Theoretical Aerodynamics. In 1993 he left NLR to become Professor on the Chair Aircraft Aerodynamics, specifically Theoretical Aerodynamics, at the Department of Aerospace Engineering of Delft University of Technology, to teach fluid dynamics and to carry out research on various subjects in fluid dynamics, including vortex flows and adverse-weather aerodynamics. Since February 1998, he has been a Professor at the University of Twente. He is a Senior Member of AIAA and served on the Applied Aerodynamics Technical Committee and on the Fluid Dynamics Technical Committee.



KENNETH J. HOLT retired from McDonnell Douglas Corporation in 1990. He had been involved in flight test operations and marketing. He received his B.Sc. from Hampton University in Virginia and his M.B.A. from the University of Missouri, St. Louis. He served 20 years in the U.S. Air Force and retired as a lieutenant colonel and a command pilot. His background is in fighters: he has flown the F-86, F-100, F-4, F-15, and F-18 and spent tours in the Air Training Command and Strategic Air Command. He joined McDonnell in 1973. There he flew production test flights and was the company's interface with the military and Federal Aviation Administration for test flights. He developed much of the flight test operating procedure for the F-18 and AV8B, and was the McDonnell flight operations consultant to the Government Aircraft Factory F-18 facility at Avalon, Australia. He retired from active flying in 1984. Mr. Holt served as chairman of the Aircraft Operations Technical Committee from 1985–1987. He is a Senior Member of AIAA.



MAHENDRA C. JOSHI is a Manager in Noise Engineering at Boeing Commercial Airplanes in Seattle, Washington. Prior to this assignment, he was responsible for acoustics and propulsion technologies in the Phantom Works organization of McDonnell Douglas in Long Beach, California. Dr. Joshi has more than 20 years of experience in the development of acoustic technology for air and space vehicles. This includes prediction and control of engine and airframe noise sources, sonic loads, and transmission of noise inside vehicles. He was selected as MDC Technical Fellow in 1993. He conducted rotorcraft noise research at Bell Helicopter Textron in Fort Worth, Texas, for four years and was a Postdoctoral Research Associate at NASA Langley Research Center for two years. He is an Associate Fellow of AIAA and was a member of the Aeroacoustics Technical Committee. He received his Ph.D in Aerospace/Mechanical Engineering from the University of Tennessee Space Institute in 1977.

BELLUR L. NAGABHUSHAN is a Professor of Aerospace Engineering at Saint Louis University. He received his B. Tech. degree in Aeronautical Engineering from the Indian Institute of Technology, Madras, India, in 1971, and his M.S. and Ph.D. degrees in Aerospace Engineering from Virginia Polytechnic Institute and State University in 1973 and 1977. After completing his graduate studies, he joined the Defense Systems Division of Goodyear Aerospace Corporation in Akron, Ohio. Here he evolved advanced V/STOL airship and hybrid rotorcraft configurations and investigated their flying qualities. Subsequently, he conceived and demonstrated smart dispensing concepts for tactical weapons and also served on projects related to aircraft flight simulator development. In 1987 he joined the Bendix/King Avionics Division of Allied Signal Aerospace Company in Fort Lauderdale, Florida, as a Senior Staff Engineer and was involved in the development of a digital FBW system for aircraft flight control. Dr. Nagabhushan has broad research interests that include all types of flight vehicles and associated flight mechanics and control technologies. He has authored over 75 technical papers and articles in archival journals, holds several patents, and has received numerous awards for technical and scholarly achievements. He is a Fellow of The Aeronautical Society of India, an Associate Fellow of AIAA, and serves on the Lighter-Than-Air Systems Technical Committee of AIAA. In addition to being an Associate Editor of this journal, Dr. Nagabhushan is also responsible for its International Board of Editors.

CONRAD F. NEWBERRY is currently Professor of Aeronautics and Astronautics at the U.S. Naval Postgraduate School in Monterey, California, and Professor Emeritus at California State Polytechnic University, Pomona, in Pomona, California. He received his BEME (Aeronautical Sequence) degree from the University of Southern California in 1957, his MSME (Fluids Option) and MAEd (test, evaluation) degrees from California State University, Los Angeles, in 1971 and 1974, respectively, and his D.Env. degree from the University of California, Los Angeles, in 1985. Dr. Newberry has held senior engineering positions with North American Aviation, Atlantic Research, Celesco, Lockheed Aircraft Service, Northrop, and Rockwell International. During his 18 years in industry he was involved in the manufacture, research, or development of the B-47, L-5, F-86, X-15, and Space Shuttle aircraft and the Athena sounding rocket. Dr. Newberry is the author or co-author of over 50 papers, reports, books, and engineering case studies. He has served as a Consulting Editor for the Encyclopedia of Science and Technology, as a member of the Journal Committee for the *Naval Engineers Journal*, and on the Editorial Advisory Board for the *International Journal of Engineering Education.* Dr. Newberry has served as AIAA Director Technical-Aircraft Systems and has been a member of the Aircraft Design, Applied Aerodynamics, and Atmospheric Environment AIAA Technical Committees. He is a Fellow of AIAA, the Institute for the Advancement of Engineering, and the British Interplanetary Society.

MURRAY TOBAK is a Senior Staff Scientist at NASA Ames Research Center. He has degrees from the University of California and Stanford University, and has been a Research Scientist at NACA–NASA Ames Research Center since 1948. He has specialized in theoretical studies of fluid and flight dynamics of high-speed aircraft and missiles. His studies have been aimed at identifying problems in nonlinear dynamics, flow stability, 3D separated flow, and vortex phenomena requiring basic research and new analytical and experimental tools for their solution. He is an AIAA Associate Fellow and has received NASA's Exceptional Service Award.