

Reflections and Visions

AS I began preparation of this first editorial of the new millennium I reflected on the past few years of aircraft technology development and trends. Then I noted some of the formal visions being developed by several sectors of importance to the aircraft community. In most technology areas, the last 100 years of the past millennium have seen the most substantial technology advances and, of course, include the appearance of the airplane beginning with the Wright Flyer. I believe that with the help of our Board of International Editors, the *Journal of Aircraft* and its predecessor *Journal of the Aerospace Sciences* have captured most if not all of the significant advances made. We would like to reflect on these accomplishments from a historical perspective and publish key history papers on aircraft technology as part of the AIAA 2003 celebration. We have begun selecting topics and invite others to submit topics, suggest authors, and offer to write articles. Some of the topics suggested so far include the development of the Wright Flyer, development of X-aircraft, the aircraft design process, aircraft structure, applied computational fluid dynamics, thrust vectoring, experimental aerodynamics, safety-of-flight, and unconventional concepts.

Formal visions published by several agencies will guide the near-, mid-, and long-term investments in aircraft technology. The U.S. Department of Defense has published its Joint Vision 2010. Each of the services has responded with its particular vision. For example the Air Force Vision is "Global Engagement," including its Expeditionary Aerospace Force; the Navy has adopted the vision "Forward from the Sea"; and the Army has its "Army Vision 2010." NASA has published its Aerospace Enterprise in which it has codified its Three Pillars and Ten Goals. These documents show that in the future much emphasis will be placed on achieving affordable access to space. Services expect to extend the useful life of existing systems even while developing a limited number of new systems with increased emphasis on cost avoidance or reduction. The unmanned vehicle will certainly emerge as a full partner with manned systems of the future. The impact of other fields such as human factors, information technology, propulsion, sensors, manufacturing, and materials on aircraft development will be substantial. Look also for a greater-than-normal emphasis on national (government/industry/academia) teaming on the larger S&T programs. As usual, I welcome and encourage papers on all these subjects, both on the products and on the processes.

Papers from many countries continue to be sent to this journal. Some authors require extra help with paper preparation, sometimes

because of language difficulties. This is one of the reasons we have an International Board of Editors (IBE) representing many of the countries with sustained contributions to this journal. IBE members appear on the inside front cover. Please contact them with any questions regarding publication. I also encourage them to seek articles on the key history of aircraft technology within their respective countries.

For the past two years I have made a strong effort to capture and publish some of the best papers coming out of our technical meetings. My Editorial Advisory Board, selected from a cross section of AIAA Technical Committees, has been very helpful in encouraging archival publication within their respective TCs. I have offered to put papers, identified for journal publication by Session Chairs and especially the Best Session Paper, on a fast track. Five such papers were put on the fast track this past year. I expect this number to grow over the next year.

While you are perusing the inside front cover, please note the team of Associate Editors. These individuals, appearing as the 2000 Team, are responsible for the quality and content of the journal since they obtain the reviews, make the publication decisions, and the occasional decline-to-publish decision with my approval.

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 assure that the published paper is accurate, timely, 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 pleasure of recognizing the AIAA professional staff, Norma Brennan is the Director of Publications. She ably directs all journal activity in AIAA along with her other publication responsibilities. She always finds time to answer my questions and provide encouragement to me and the Associate Editors. Brian Haefs serves very efficiently as Managing Editor. Brian goes the extra mile to deal with the often nagging details and usually anticipates the issues before they materialize. Our very capable Production Specialist 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 28 Ph.D and 55 M.S. degrees. An author of over 180 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 research, development, 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 65 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.



AHMED A. HASSAN is currently a Technical Associate at the Boeing Company in Mesa, Arizona. His area of expertise is computational fluid dynamics (CFD). Dr. Hassan received his B.S. and M.S. degrees from the University of Cairo in 1974 and 1976 respectively. He then received his Ph.D. degree from the University of Arizona in 1981. He was on the faculty of Arizona State University from 1981 to 1987 as an Assistant Professor. He joined the Boeing Company (then McDonnell Douglas Helicopter Company) in 1987 where he conducted research related to the application/development of CFD design and analysis tools to rotorcraft problems. He is the company representative on the corporate-wide CFD working group, an Associate Fellow of the American Institute of Aeronautics and Astronautics (1981 to the present) and a member of the American Helicopter Society (1987 to the present). He is currently serving as the Associate Editor for the *AIAA Journal of Aircraft* in the area of CFD. Dr. Hassan has published more than 30 archival studies and presented more than 60 papers at national and international conferences. He holds five patents and has four additional patents pending with the US Patent and Trademark Office. His work has focused on modeling the aerodynamics of rotor blade-vortex interactions and investigating novel flow control techniques for the alleviation of rotorcraft blade-vortex interaction (BVI) noise.



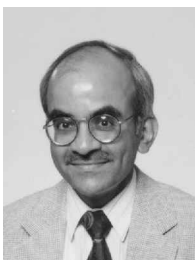
RONALD A. HESS received his B.S., M.S., and Ph.D. degrees in Aerospace Engineering from the University of Cincinnati. After completing his doctoral work, he joined the faculty of the Department of Aeronautics at the U.S. Naval Postgraduate School in Monterey, California. In 1976, he took a position at 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 Tan Beta Pi. He is also an Associate Editor of the *IEEE Transactions on Systems, Man, and Cybernetics*, and the *Journal of Aerospace*.



HENDRIK (HARRY) W. M. HOELJMAKERS 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 Fellowshipship 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.



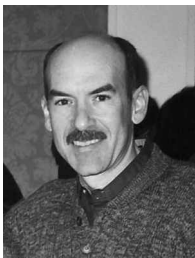
MAHENDRA C. JOSHI is a Manager in the Noise and Emissions group at Boeing Commercial Airplanes in Seattle, Washington. Prior to this assignment, he was responsible for acoustics and propulsion technologies in the Phantom Works organization of McDonnell Douglas in Long Beach, California. Dr. Joshi has 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.



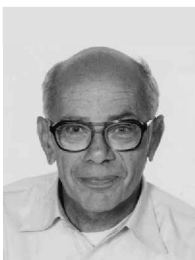
BELLUR L. NAGABHUSHAN is a Professor of Aerospace Engineering at Saint Louis University. He received his B. Tech. degree in Aeronautical Engineering from the Indian Institute of Technology, Madras, India, in 1971, and his M.S. and Ph.D. degrees in Aerospace Engineering from Virginia Polytechnic Institute 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.



RIGO PEREZ holds a Ph.D. in Aeronautics and Astronautics from Purdue University. He is currently St. Louis Program Manager for the Joint Strike Fighter Structures Prognostics and Health Management program. Dr. Perez is also principal investigator for R&D programs on airframe fatigue repairs and corrosion fatigue assessments. In his previous assignment he was a stress analyst in the Joint Strike Fighter X-32 project. During the last thirteen years at Boeing, Dr. Perez has been principal investigator of eight U.S. Government funded R&D programs and three company sponsored programs. In these projects, Dr. Perez supervised metal fatigue and fracture R&D and provided engineering support to production aircraft programs. These support efforts included the replacement of the F/A-18 landing gear steel with a higher toughness alloy, A-12 reliability studies, and more recently, F-15 fatigue repairs. In addition, Dr. Perez was assigned to the Fatigue and Fracture group in the 600 passenger MD-12 commercial aircraft project. In this project, he was responsible for durability and damage tolerance testing required for structural certification.



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.