

## A Celebration, a Wakeup call, and a Vision

**N**EXT year the *Journal of Aircraft* will join in the AIAA 2003 celebration of powered flight. Special sections of the journal will be devoted to articles depicting the past, present, and future of selected technology areas. Technology areas identified so far include aerodynamics, air transportation, structures, aeroelasticity, and aircraft multidisciplinary design. Authors' and readers' suggestions, including proposed authors for additional areas, are welcome. Each special section will contain an article broadly depicting past developments and accomplishments, one assessing current state-of-the-art, and one that projects future development. Special sections will also include additional articles depicting key elements of the technology area.

On September 11th of last year, our Nation witnessed devastating destruction at the hands of terrorists who used our own commercial aircraft as their implements of destruction. The initial blow was staggering. The longer-term, economic impact on U.S. air transportation will be monumental. As the U.S. aviation industry represents about 10% of our economic base, its future must be assured, and this will take a National determined effort on all fronts. Well before our "9/11 call," the airlines were suffering from the protracted decline in the U.S. economy and increased fuel prices. Growing pressure from international competition added to the equation. Perhaps it is time for the Nation to develop a long-term transportation vision and policy to integrate air, rail, waterways, and highway components. Such a system or network should be economically viable, safe, and secure. A long-term clean-vehicle transportation strategy could be fully integrated with a National energy policy for more effective resource management, dramatically reduced dependence on foreign oil, and the measured introduction of alternative sources including biofuels.

Within such an environment, air transportation could be re-invented and indeed revolutionized during our next century of powered flight. Air vehicle technology could provide advanced hypersonic aero spacecraft, unmanned aircraft (an emerging priority for military application), high-endurance lighter-than-air vehicles, next-generation supersonic transport, blended wing-body concepts, personal point-to-point aerocars, and a host of other concepts. These concepts would be based on projected revolutions in materials—including nano- and biomaterials—and computers—including nano and biocomputers—all with capability for intelligent, seamless interface with the other elements of a National Transportation Network. I believe the development and operation of such a network would provide a measure of National economic stability well beyond any other National endeavor.

As always, this journal will publish the results of technical or economic analysis needed to support the vision for the next century of powered flight.

Turning now to some journal business, we welcome William Mason from Virginia Institute of Technology as a new Associate Editor. He will handle papers on design, including the Design Forum.

My staff of Associate Editors has 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 now have an International Editors Board, thanks to the efforts of Associate Editor Bellur Nagabhushan, representing 14 of the countries with sustained contributions to this journal. IE Board members appear on the inside front cover. Please contact them in your country with any questions regarding publication.

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 Associate Editors appearing as the "2002 Team." These people serve with high dedication to help you transform your papers into archival articles.

My Editorial Advisory Board helps better link the journal to the appropriate AIAA Technical Committees (TCs). This Board is made up of members of several AIAA TCs, which I try to visit each year. They help represent journal publication at their TC meetings as well as encourage journal publication of good meeting papers. Some of these Board members serve as Publications Committee members for 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 assure that our published articles and notes are accurate, timely, important to 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 provide encouragement to me and the Associate Editors. Aimée Munyan served very capably as our Managing Editor over much of last year, but has moved on to newer things, and our new Managing Editor, Jen Samuels, came up to speed in record time. She is also highly capable, efficient, and excellent to work with.

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 as the Manager of the DARPA/NASA/USAF X-29 Advanced Technology Demonstrator. He served as Chief of the Wind Tunnels Branch and 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 1998 and is currently with Universal Technology Corporation in Dayton, OH.

## Associate Editors



**NDAONA CHOKANI** is a Professor of Aerospace Engineering at North Carolina State University. He received his B.A. (Honors) in Engineering Science from Oxford University in 1984 and Ph.D. in Engineering from Cambridge University in 1988. Dr. Chokani joined the faculty at NC State University in 1988, where he has been actively involved in teaching and research. His graduate advising has resulted in seven Ph.D. and 12 M.S. degrees. His current research interests include experimental aerodynamics, flow diagnostics, active flow control systems, transition of laminar-to-turbulent flows, and digital signal and time-series processing techniques. He is an Associate Fellow of the AIAA and serves on the Aerodynamic Measurement Technology Technical Committee.



**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 was the Minta-Martin Research Professor from 1996-2000. 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 (UM). 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 30 Ph.D. and 58 M.S. degrees. An author of over 125 archival 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 Boards of three journals: *Vertica* (1987-91), *Smart Materials and Structures* (1994-cont.), and *SADHANA* (1991-95). He was awarded the 2001 American Society of Mechanical Engineers Adaptive Structures and Material Systems Prize, the 1996 AIAA/ASME Best Paper Award, and the 1992 UM's Distinguished Research Professor. 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 Boeing Technical Fellow 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 AIAA (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 six patents and has four additional patents pending with the U.S. Patent and Trademark Office. His work has focused on modeling the aerodynamics of rotor blade-vortex interactions and investigating novel flow control techniques for rotorcraft applications.



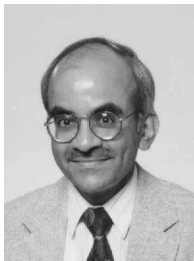
**RONALD A. HESS** received his B.S., M.S., and Ph.D. degrees in Aerospace Engineering from the University of Cincinnati. After completing his doctoral work, he joined the faculty of the Department of Aeronautics at the U.S. Naval Postgraduate School in Monterey, California. In 1976, he took a position 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's 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 Institute of Electrical and Electronics Engineers, 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*, and the *British Journal of Aerospace Engineering*.



**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 he 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.



**MARK J. JOHNSON** is the Advanced Structures Team Leader in Airframe Integration for Boeing-Phantom Works in St. Louis. He is a Program Manager and Principal Investigator on several research and development efforts, developing new aircraft structural technologies from the conceptual to the EMD-ready stage. Dr. Johnson holds degrees in Aerospace Engineering from Saint Louis University, and Civil Engineering and Mechanical Engineering from Washington University in Saint Louis. He currently serves on the AIAA Survivability Committee and the Structures Technical Committee, and he is a Member of Sigma Xi, the American Helicopter Society, and the American Society of Mechanical Engineers. Dr. Johnson previously served in the U.S. Air Force in Aerospace Control and Warning.



**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.



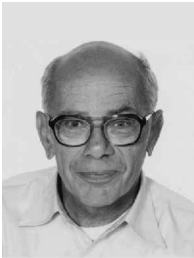
**WILLIAM H. MASON** is a Professor in the Aerospace and Ocean Engineering Department at Virginia Institute of Technology. Before returning to Virginia Tech to teach Aircraft Design and Applied Aerodynamics, he spent nearly 15 years in the aerospace industry, all in the Engineering Department at the Grumman Aerospace Corp. There, he worked in aerodynamic methodology development, aerodynamic design at the component level (airfoils and wings), and the last five years in configuration design of advanced concepts. As a co-op/summer student he worked in the wind tunnels, flight test, and advanced spacecraft design at McDonnell Aircraft, St. Louis, and in helicopter flight test at Edwards AFB. He has been at Virginia Tech for 13 years, where he advised student aircraft design teams who won the AIAA Undergraduate Team Aircraft Design Competition seven times in 12 years. His research is in design and optimization of aerospace systems, MDO, and applied aerodynamics. His degrees are all in Aerospace Engineering from Virginia Tech: Ph.D., 1975, M.S., 1972, B.S., 1971.



**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.



**THOMAS W. STRGANAC** is an Associate Professor of Aerospace Engineering at Texas A&M University. He received his B.S. in Aerospace Engineering from North Carolina State University in 1977, his M.S. in Aerospace Engineering from Texas A&M University in 1980, and his Ph.D. in Engineering Mechanics from Virginia Polytechnic Institute and State University in 1987. In 1975 he joined the staff at NASA's Wallops Flight Center where he served as an Engineer in NASA's Sounding Rocket Program Branch and the Lighter-Than-Air Program Office. In 1982 he transferred to NASA's Langley Research Center where he served as a Research Engineer until 1989. In 1989 he accepted an appointment on the faculty at Texas A&M University. His research interests focus on fluid-structure interaction, structural dynamics, nonlinear mechanics, material/system identification, and aeroelastic phenomena. He is a recipient of a National Science Foundation CAREER award with research focussed in fluid-structure-control interaction. He has organized and presented internationally the short courses—*Hazardous Flight Tests* and *Aeroelasticity*, and he is the co-author of the text titled *Introduction to Flight Test Engineering*. He has served on the Lighter-Than-Air Systems Technical Committee, the Balloon Systems and Technology Technical Committee, and the Structural Dynamics Technical Committee. He is an Associate Fellow of the AIAA and a registered professional engineer.



**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.