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It All Started 100 Years Ago

WE have developed a set of special sections, to be published throughout this year, each recounting selected key events of the past 100 years following the historical first powered flight by Orville Wright. Planned specific topics include: flight vehicle aerodynamics structures, aeroelasticity, aircraft multidisciplinary design, and air transportation. As conceived and developed by Associate Editor Frank Eastep, each special section will lead off with an article reviewing the history aspects. Another will review the current state of the art, while a third will attempt to project future trends. These three will then be followed by a series of discipline-area perspectives.

Ahmed Hassan, one of our Associate Editors who handles papers in the areas of computational fluid dynamics (CFD) and flow control, provides this preview of the recent accomplishments and challenges in CFD for aircraft technology application:

The year 2002 saw great strides in the application of computational fluid dynamics (CFD) analysis and design tools for a myriad of problems. With the unprecedented advances made in computer technology, and with the availability of low-cost, desktop, high-performance computer platforms that rival the supercomputers of the 90's, more novel applications of CFD were introduced (e.g., the design of advanced fixed-wing vehicles for aerial surveillance). In general, while the majority of the applications continued to focus on probing the global features of a flowfield about a complex aircraft configuration, others focused on advancing the understanding of physical phenomena (e.g., vortex formation, propagation) and identifying the necessary numerical schemes required to yield accurate solutions. Moreover, the widespread adoption of the unstructured grid technology has undoubtedly facilitated the generation of grid systems for complex configurations and has allowed solutions that were deemed impossible a few years ago. Today, in addition to the illusive turbulence modeling issue, researchers and engineers are faced with a greater challenge: namely, the identification of accepted procedure(s) to assess the accuracy of the vast amount of numerical solutions. Consequently, as we move towards 2003 and beyond, turbulence modeling and code validation will remain integral parts of the application of CFD.

Associate Editor Murray Tobak, who handles papers in the area of nonlinear and unsteady aerodynamics, shares the following perspective on the challenges and opportunities in the application of nonlinear fluid and flight mechanics:

Computational and experimental research studies leading to correct modeling continue to be needed for fundamental investigations of fluid dynamic phenomena that can occur during maneuvering flight. Typical questions include origins of steady and unsteady three-dimensional flow separation, the nature of leeward-side vortex flow structures, sources of vortex asymmetry, and vortex breakdown. Studies of phenomena that contribute to flight dynamic problems, such as unsteady aerodynamics and rate-dependent effects, and the nonlinear interactions between fluid flow and body motions are of interest. The goal is to reach a fundamental understanding of these fluid dynamic phenomena to permit their prediction and utilization.

Ken Holt, also an Associate Editor, has provided this preview of his special section on air transportation:

Most of the subjects are focusing on economy—both in the air vehicles and the system in which they operate. The air carrier industry has been through a time of great upheaval in the past years, culminating in complete shutdown following the tragedy of September 11, 2001. The airline industry management is rethinking new purchases of aircraft, cutting unprofitable routes, and reducing employment. New ways of managing spares and routine inspections are being investigated as well. On the other hand, the aircraft manufacturing industry is constantly trying to improve aircraft products to improve sales. Technology has not been standing still during these hard times for the air carriers. Manufacturers have been designing aircraft like the Sonic Cruiser that flies faster and has longer range. To implement new products, engineering is turning to new computer design techniques, verifying many of the systems with simulation rather than reliance on costly flight testing. The Air Traffic Control system has been promising better efficiencies for the air transportation industry for many years. It seems that when the equipment is purchased, the systems to implement and operate the equipment are not yet available. The air transportation industry, manufacturers, and academic institutions are working to resolve the integration of parts, people, and procedures.

In summary, the air transportation industry was operating on a shaky financial foundation for quite a few years. The events of 9/11 brought the situation to a critical point. The industry will survive, and in fact thrive, given the important place it has in the economy of our country.

In addition, Associate Editor Bellur Nagabhushan has arranged for an extended Editorial covering several inputs from our Board of International Editors, participating in our celebration of 100 years of powered flight.

Last October we began the long-awaited electronic submission process for the *Journal of Aircraft.* Authors now go to WriteTrack.net and are led through a simple process, similar to the electronic submission of AIAA meetings papers. An e-mail is automatically sent to me after each submittal is processed, and I assign an Associate Editor. This much of the process averages about one day, as opposed to one week or more using the previous way of regular mail. As of this writing, we don't have enough experience with the new procedures to say how much time will be saved overall, but it is expected to be substantial.

Turning now to some journal business, I would like to recognize the continued dedicated service of our fine Associate Editors who appear as the "2003 Team." The quality of the published papers attests to their thoroughness and willingness to help authors bring out their best. Occasionally an Associate Editor will find that a non-U.S. author needs extra help with language or publication format. Dr. Nagabhushan oversees our Board of International Editors, which represents 14 countries and is listed on the inside front cover. They are ready to help authors in their respective countries with any such publication difficulties.

We are fortunate to have an Editorial Advisory Board (EAB), also listed on the inside front cover. Each EAB member is also a member of a Technical Committee (TC) relevant to this journal. In this way, these TCs have a solid link to the journal for archival publication of their best meetings papers. EAB members also stimulate ideas for special sections dealing with topics of TC interest.

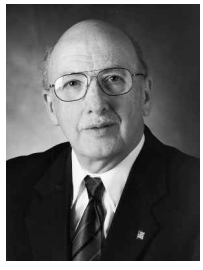
The names of the past year's Reviewers, through 1 October 2002, appear in this issue. I am sure you recognize many of these individuals and I certainly wish to thank them for their technical insight and willingness to assure that our published articles are accurate, timely, important to readers, and will retain lasting value. This journal would not exist without dedicated Peer Reviewers.

Norma Brennan, AIAA Director of Publications, heads our professional AIAA staff. She ably directs all journal activity along with her other publication duties. She was especially helpful this past year as we developed and launched the WriteTrack online submission procedure for the *Journal of Aircraft.* Jen Samuels is our Managing Editor. Some of our Associate Editors met Jen when she provided an Associate Editor Training Session in Reno last year. Jen has been of great help to Associate Editors and authors, demonstrating great patience and thoroughness. Jen also expertly helped develop the WriteTrack procedure. However, we would not have the

WriteTrack procedure at all without the technical support of John McAndrew and Sean Malone. They designed the entire procedure and then worked with Editors-in-Chief and Associate Editors to identify remaining concerns and to incorporate constructive ideas. I look forward to continuing my association with this fine professional staff.

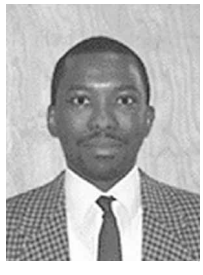
Thomas M. Weeks
Editor-in-Chief

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 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 (NC) State University. He received his B.A. (Honors) in engineering science from Oxford University in 1984 and his 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 17 M.S. degrees. His current research interests include experimental aerodynamics, transition of laminar-to-turbulent flows, instrumentation, and digital signal processing techniques. His work has been supported by Air Force Office of Scientific Research, Air Force Research Laboratory, NASA, and National Science Foundation. He has served as a member of the AIAA Aerodynamics Measurement Technology Technical Committee (TC) and currently serves on the AIAA Thermophysics TC and the AIAA Transition Working Group. He is an Associate Fellow of the AIAA.

INDERJIT CHOPRA is an Alfred Gessow Rotorcraft Professor in Aerospace Engineering and Director of the Alfred Gessow Rotorcraft Center at the University of Maryland. He was the Minta-Martin Research Professor from 1996 to 2000. He received his B.S. in engineering from Punjab Engineering College, Chandigarh, India, in 1965; his 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 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. 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 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.

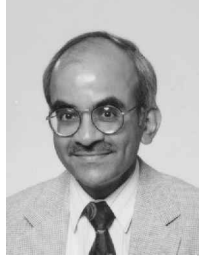
FRANKLIN E. EASTEP is an Emeritus Professor of Aerospace Engineering at the University of Dayton. He received a B.S. in aeronautical engineering from Ohio State University in 1958, an M.S. in aeronautics from Air Force Institute of Technology in 1963, and a Ph.D. in aeronautics and astronautics from 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 that period, he has been the principal for 18 doctoral candidates and over 45 masters 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 is a Fellow of AIAA. He is presently an NRC Senior Research Associate with the Air Force Research Laboratory at Wright–Patterson AFB.

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. from the University of Cairo in 1974 and 1976 respectively. He then received his Ph.D. 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 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. 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. His 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 the Institute of Electrical and Electronics Engineers, 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 *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.S. 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 Chair of the Aircraft Operations Technical Committee from 1985 to 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 in 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.

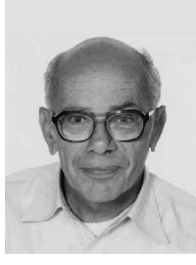


MAHENDRA C. JOSHI is a Manager in the Noise and Emissions group at Boeing Commercial Airplanes in Seattle, Washington. Prior to this assignment, he was responsible for acoustics and propulsion technologies in the Phantom Works organization of McDonnell Douglas in Long Beach, California. Dr. Joshi has 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 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. in aeronautical engineering from the Indian Institute of Technology, Madras, India, in 1971, and his M.S. and Ph.D. 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, where 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 Chair of 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 has organized and presented internationally short courses on Advanced Flight Tests (with Donald T. Ward) and Aeroelasticity, and he is the coauthor of the text titled *Introduction to Flight Test Engineering*. He has served on the Lighter-Than-Air Systems Technical Committee (TC), the Balloon Systems and Technology TC, and the Structural Dynamics TC. 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.