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No Aircraft Technology Before Its Time

IN my editorials over the past several years I have challenged the aircraft technology community to once again begin generating innovative aircraft concepts. Many, including investment capitalists and defense R&D budget planners, have pointed out the lack of recent developments of the magnitude of past years' airframe innovations such as area rule, V/STOL, composite structures, etc. I've been asked "who are the aircraft technology innovators of today?" I have maintained that unsteady aerodynamics and integration (across aircraft disciplines) technology were certainly two of the remaining frontiers thus far not exploited. Taking a somewhat different look at the issue of innovation, perhaps we could revisit innovations of the past which have not transitioned to application. Failure to transition may have been due to shortcomings in technology. So my question then becomes: "What aircraft technology innovations, having been shelved in the previous (30?) years due to lack of supporting technology, should be revisited for application because such supporting technology is now at hand? Forward swept wings were initially "swept" into oblivion following the invention of wing sweep owing then to classical structural divergence. New structures technology and composite materials application, however, have allowed their re-birth for exploitation. Moreover, advances in supercritical wings, variable camber, relaxed static stability, etc., combine well with the reborn forward swept wing. Each reader of the *Journal of Aircraft* should be able to list several technology innovations which, due to lack of supporting technology, were not ready for application. Perhaps a comprehensive survey of "discarded" aircraft technologies worthy of re-examination in light of recent enabling and complementing technology innovations, should be undertaken within each of the major disciplines of the *Journal of Aircraft.* I would be happy to publish a Special Section devoted to such papers surveying or otherwise based on this concept. Perhaps the most exciting new target of opportunity for new or revisited highly innovative configuration concepts is the Uninhabited Air Vehicle (UAV). We may indeed have to look to UAV innovations as a springboard for future generations of manned aircraft.

Over the past year, all of the journals of the AIAA have seen a decline in the number of accepted papers in the backlog. For the *Journal of Aircraft* a viable number is 65, allowing the staff to plan ahead for at least two bi-monthly issues. A larger number can mean excessive time to publication. As of this writing we have 38 papers in the accepted backlog. On the other hand we have well over 200 papers not yet accepted! The primary reason for this is delay in revision. Much of this delay is due to having to simply follow the journal format requirements. Authors, Reviewers, and Editors could save much time if submitting authors reviewed the inside back cover of the journal and followed the style, figure requirements, math requirements, reference format, etc., required of any archival journal. If the (funded) work was worth doing, it should be worth preserving in journal form. To ensure timely publication, however, authors should take the time up front to put their submittals into "journal readiness" quality format. Many do, and for that I am grateful. But many still do not. If you have any procedural questions prior to submitting your paper, please contact me or one of my Associate Editors, listed on the front inside cover. International authors may wish to contact an International Editor from their country, also listed on the inside front cover, for assistance.

Over the past year we have experienced several occasions where non-U.S. authors needed some extra help with journal policy, perhaps due, in part, to language difficulties. This is one of the reasons we have an International Board of Editors representing most of those countries with sustained contributions to this journal. Please contact them with any questions regarding publication. To facilitate this, Dr. Nagabhushan, my AE for International Editors, suggested—and I have initiated—a letter to authors, upon receipt of international submittals. This letter provides the address of the author's International Editor suggesting early contact to assist with any procedural matters.

I would like to complete this year's editorial with some well deserved recognition of both the volunteer and professional staff. Beginning with the volunteers, my dedicated staff of Associate Editors appear as the 1997 team following this editorial. They know how to help you transform your excellent manuscripts into archival-quality papers.

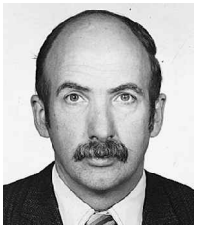
The Editorial Advisory Board was formed in 1993 to represent those AIAA Technical Committees most active in areas within the journal scope. They encourage publication of good meeting papers in this journal. This year, I encourage them to identify "best paper award" nominees for placement on a fast track to ensure that the best material is published with minimum delay.

The names of last year's Reviewers, through October, also appear in this issue. They provide the critical reviews that result in the maximum possible time value of the papers that are accepted. They also provide valuable input to authors of declined papers regarding rebuttal suggestions or future submissions. The *Journal of Aircraft* would not exist but for the dedicated, insightful work of these Reviewers.

Now for the professional staff. Norma Brennan, AIAA publications, ably directs all journal activity in AIAA. Yet she always makes time to provide encouragement, answer my numerous questions, and provide inspiration to me and my Associate Editors. Jamie Fear serves as our Managing Editor. Her facility with electronic communication and attention to detail, along with genuine concern for the quality of the journal has been extremely helpful to me. Finally, I appreciate the efforts of our Production Specialist, Brian Haefs. Striving for top-quality format, Brian covers all six journals from a production/layout standpoint.

Thomas M. Weeks
Editor-in-Chief

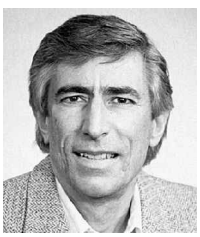
Editor-in-Chief



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 Lab at Wright–Patterson AFB, Ohio. His initial work was in the area of electrogasdynamics at the nearly completed 50 MW facility. In 1968, he separated from the Air Force but remained at the same location working as a civilian. He was assigned in 1972 to the Analysis Group attached to the Aeromechanics Staff working on transonic wind tunnel wall interference. In 1976, he became Technical Manager of the External Aerodynamics Group of the Aerodynamics and Airframe Branch. He then served as deputy and acting manager of the X-29 Advanced Technology Development Program. He is currently Chief of Technology Strategy in the Flight Dynamics Directorate of Air Force Wright Aeronautical Laboratory. Dr. Weeks is an Associate Fellow of AIAA.

Associate Editors

RAMESH K. AGARWAL is currently the Bloomfield Distinguished Professor and Chairperson of the Department of Aerospace Engineering at Wichita State University in Wichita, Kansas. He is also the Director of Aircraft Design and Research Center and a Senior Fellow of the National Institute for Aviation Research at Wichita State. From 1978 to 1994, he was with McDonnell Douglas Aerospace in St. Louis where he was a McDonnell Douglas Fellow. He received a B.S. in Mechanical Engineering from the Indian Institute of Technology, Kharapur, India, in 1968; an M.S. in Aeronautical Engineering from the University of Minnesota in 1969; and a Ph.D. in Aeronautical Sciences from Stanford University in 1975. Dr. Agarwal has worked in all aspects of CFD, namely, grid generation, adaptive and multigrid methods, solution of nonlinear potential, Euler, and Navier–Stokes equations, viscous-inviscid interactions, boundary-layer flows, and turbulence modeling. He has also worked in other areas of computational aerosciences such as computational aeroacoustics, computational electromagnetics, parallel processing, and CFD-based expert systems. The author of over 100 articles and papers, Dr. Agarwal has been an Affiliate Professor of Mechanical Engineering at Washington University, St. Louis, from 1986 to 1994. He is a Fellow of AIAA, ASME, and AAAS; and has served on its Fluid Dynamics Technical Committee from 1986 to 1989, and on the AIAA Multidisciplinary Optimization Committee from 1991 to 1992. He is at present a member of AIAA Academic Affairs Committee and the Aeroacoustics Technical Committee. He is also an AIAA Distinguished Lecturer for 1996 to 1997.



MARTIN E. BEYERS currently heads the Aircraft Aerodynamics Group at the National Research Council's Aerodynamics Laboratory in Ottawa, Canada. He received his Ph.D. from the University of the Witwatersrand in 1978, and was Head of the NIAST Flight Mechanics Division at CSIR, South Africa, until he joined the NRC in 1981. He has served on the AIAA Technical Committees on Atmospheric Flight Mechanics and Applied Aerodynamics, and on several multinational working groups. He is presently Canadian National Leader on HTP-5, the TTCP panel on Combat Aircraft Aerodynamics. He has specialized in high-alpha unsteady aerodynamics and free-flight dynamics, introducing a number of new concepts for wind-tunnel dynamic testing, and for modeling unsteady separated flow phenomena. He is a Fellow of the Canadian Aeronautics and Space Institute, and a Senior Member of AIAA.

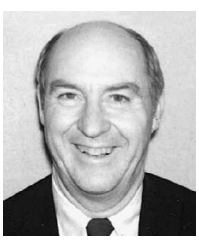
INDERJIT CHOPRA is a Professor of Aerospace Engineering and Director for the Center for Rotorcraft Education and Research at the University of Maryland. He received a B.Sc. in Engineering from Punjab Engineering College, Chandigarh, India, in 1965; an M.E. from Indian Institute of Science, Bangalore, India, in 1968; and a Sc.D. from the Massachusetts Institute of Technology in 1977. He worked at the National Aeronautical Laboratory in Bangalore from 1966 to 1974. His research there included aeroelastic wind tunnel testing of scaled models of airplanes and launch vehicles. At MIT, he worked on aeroelastic analysis of wind turbine rotors for his doctoral dissertation. In 1977, he joined NASA Ames/Stanford University Joint Institute of Aeronautics and Acoustics, where he researched aeroelastic analysis of advanced rotor systems and dynamic testing of full-scale helicopters in the NASA Ames 40 x 80 ft wind tunnel. In 1981, he joined the University of Maryland. He has been working on problems related to helicopter dynamics, including aeromechanical stability, smart structures applications, active vibration control, structural health monitoring, composite blade modeling, and aeroelastic optimization. An author of over 140 articles and papers, Dr. Chopra was also an Associate Editor of the *Journal of the American Helicopter Society* and a member of the editorial advisory board of *Vertica, The International Journal of Rotorcraft and Powered Lift Aircraft,* and *Smart Materials and Structures*. He is a Fellow of AIAA and AHS.

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.

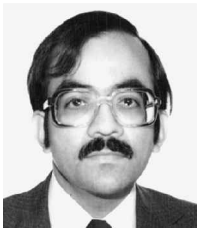
FRANKLIN E. EASTEP is a Professor of Aerospace Engineering at the University of Dayton. He received a B.S. from Ohio State University in 1958, an M.S. in Aeronautical Engineering from the Air Force Institute of Technology in 1963, and a Ph.D. in Aeronautics and Astronautics from Stanford University in 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.

THOMAS N. FARRIS received his BSME from Rice University in 1982. His graduate education was at Northwestern University in Theoretical and Applied Mechanics leading to a Ph.D. in 1986 at which time he joined the School of Aeronautics and Astronautics of Purdue University, where he is now a Professor, teaching courses in tribology, structural analysis, plates and shells, finite elements, and elasticity. He spent the summer of 1991 on a Japan Society for the Promotion of Science Fellowship and the fall of 1991 as a sabbatical visitor to the Cambridge University Engineering Department. He has made contributions in using fracture mechanics to explain the material removal mechanism in the fine finishing of ceramic materials and various aspects of contact fatigue. These contributions led to support by NSF through a Presidential Young Investigator Award in 1990 and the ASME Burt L. Newkirk Award in 1992. His present research interests are in tribology, manufacturing processes, and fatigue and fracture with ongoing projects in the area of fretting fatigue of aging aircraft and the effect of manufacturing processes, including grinding, hard turning, superfinishing, and heat treatment on component performance.

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 Naval Postgraduate School in Monterey, California. In 1976, he joined the staff of 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*.



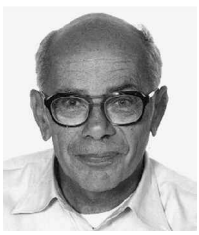
KENNETH J. HOLT retired from the McDonnell Douglas Corporation in 1990. He had been involved in flight test operations and marketing. He received his B.Sc. from Hampton University in Virginia and his M.B.A. from the University of Missouri, St. Louis. He served 20 years in the U.S. Air Force and retired as Lieutenant Colonel and a Command Pilot. His background is in fighters, having flown the F-86, F-100, F-4, F-15, and F-18, and also 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 procedures 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 1985–87. He is a Senior Member of AIAA.



MAHENDRA C. JOSHI is currently Group Leader, Acoustics Technology at McDonnell Douglas Aerospace, Long Beach, California. He received his Ph.D. in Aeronautical Engineering from the University of Tennessee Space Institute in 1977. He was a postdoctoral research associate for two years at NASA Langley/George Washington University's Joint Institute for Advancement of Flight Sciences and performed research in blown flap noise and airframe noise. In 1979 he joined Douglas Aircraft Company as Senior Acoustics Engineer responsible for studies of sound propagation and attenuation in engine ducts. In 1983 he moved to Bell Helicopter Textron and was the principal investigator of rotorcraft exterior noise research activities including the NASA-sponsored National Rotorcraft Noise Reduction Program. He returned to the Douglas Aircraft Company in 1988 and is currently managing aircraft acoustics technology development activities. Dr. Joshi is a Member of AIAA and the Aeroacoustics Technical Committee. He was also a member of the American Helicopter Society's Acoustics Technical Committee.

JAMES M. LUCKRING received his B.S. degree in Aeronautical and Astronautical Engineering in 1973 and his M.S. degree in Aeronautics and Astronautics in 1974, both from Purdue University. In 1985 he received his Ph.D. in Aeronautical Engineering from North Carolina State University. Dr. Luckring joined the staff of the NASA Langley Research Center in 1974 where he is now the Head of the Transonic/Supersonic Aerodynamics Branch in the Aero- and Gas-Dynamics Division. He has conducted and directed aerodynamic research programs at subsonic, transonic, and supersonic speeds for both commercial and military aircraft concepts. Dr. Luckring has performed a variety of experimental investigations of high angle-of-attack aerodynamic properties including transonic and high Reynolds number considerations. He has also performed and led a variety of applied computational fluid dynamic (CFD) studies of these flows. In addition, Dr. Luckring teaches graduate level classes in aerodynamics as an Associate Professorial Lecturer for the George Washington University. Dr. Luckring is the author or coauthor of 48 scientific publications and an Associate Fellow of AIAA.

BELLUR L. NAGHABHUSHAN is a Professor of Aerospace Engineering at Parks College of Saint Louis University in Cahokia, Illinois. He received his B. Tech. degree in Aeronautical Engineering from 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 conceptual and preliminary designs of advanced V/STOL airship and hybrid rotorcraft configurations and investigated their flying qualities. Subsequently, he was involved in developing aircraft based weapon systems. He conceived, developed prototypes, and demonstrated innovative concepts for tactical weapons which sequentially dispense munition into desired patterns. He also served as a consultant on projects related to aircraft system design, performance analysis, and 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 which include all types of flight vehicles and associated flight mechanics and control technologies. He has authored over 60 technical papers and articles in archival journals. He holds several patents in the U.S. and Europe and has received numerous Engineering Awards for Technical and Scholarly Achievements. He is an Associate Fellow of AIAA and serves on its Lighter-Than-Air Systems technical committee. In addition to being an Associate Editor of this journal, Dr. Nagabhushan also serves as an Associate for its International Board of Editors and is responsible for their activities.



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 Ames Associate Fellow and has received NASA's Exceptional Service Award.