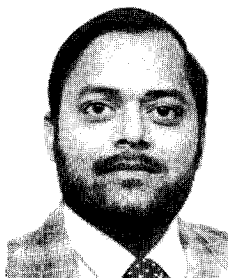
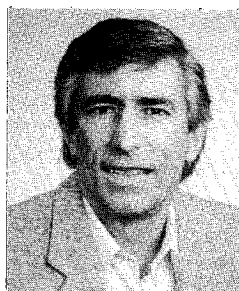


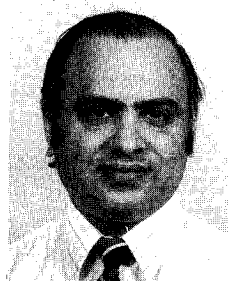
The 1993 Team



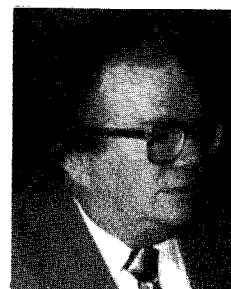
R. K. Agarwal



M. E. Beyers



I. Chopra



R.E. Duffy



F. E. Eastep



L. E. Ericsson



T. N. Farris



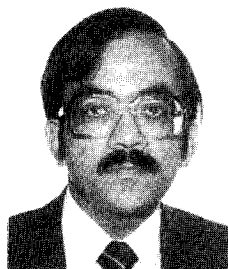
R. A. Hess



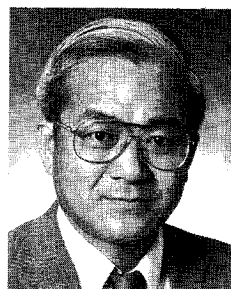
H. H. Heyson



K. J. Holt



M. C. Joshi



C. F. Lo



B. L. Nagabhushan



T. M. Weeks

Ramesh K. Agarwal

Ramesh K. Agarwal is currently the Program Director for Advanced Computational Fluid Dynamics at McDonnell Douglas Research Laboratories. He received a B.S. in Mechanical Engineering from the Indian Institute of Technology, Kharagpur, 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. Since joining the staff at MDRL in 1978, 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. Recently, he has initiated new programs in the areas of computational aeroacoustics, computational electromagnetics, parallel processing, and CFD-based expert systems.

The author of over 60 articles and papers, Dr. Agarwal has been an Affiliate Professor of Mechanical Engineering at Washington University, St. Louis, since 1986. He is an Associate Fellow of the AIAA; and after serving on its Fluid Dynamics Technical Committee from 1986 to 1989, he is currently a member of the AIAA Multidisciplinary Optimization Committee.

Martin E. Beyers

Martin E. Beyers is currently Group Leader, Aircraft Aerodynamics, in the Applied Aerodynamics Laboratory at the National Research Council of Canada. Before joining the NRC in 1979 he was Head of the Flight Mechanics Division of NIAST, CSIR, South Africa. He received a BSc. from the University of Stellenbosch in 1961, and BSc. Honours (1965) and Ph.D. (1978) degrees from the University of the Witwatersrand, Johannesburg. Dr. Beyers has served on the AIAA Technical Committees on Atmospheric Flight Mechanics and Applied Aerodynamics. He was a member of AGARD FDP Working Group 11 and technical editor of its final report. He is presently a member and coordinator of AGARD FDP Working Group 16 on Rotary Experiments for Manoeuvring Aircraft Dynamics. He has conducted extensive research on high-alpha unsteady aerodynamics and free-flight dynamics, introducing a number of new wind-tunnel dynamic testing concepts, and recently initiated research projects on maneuvering aerodynamics, dynamic ground effects, and aerodynamics of contaminated wings. He is the author of over 60 articles and reports.

Inderjit Chopra

Inderjit Chopra is a Professor of Aerospace Engineering 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 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 × 80 ft wind tunnel. In 1981, he joined the University of Maryland. He is a major participant of the Army's Center of Rotorcraft Education and Research at Maryland. An author of over 80 articles and papers, Dr. Chopra is 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*. He is a Fellow of AIAA.

Robert E. Duffy

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. Duffy has served as a consultant to numerous governmental agencies, industrial concerns, and individuals. His most recent publications have been involved with the measurement of aerodynamic control hinge moment at high Mach numbers.

Franklin E. Eastep

Franklin E. Eastep is a Professor, the Director of Aerospace Engineering, and the Associate Dean for Graduate 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 Associate Fellow of AIAA.

Lars E. Ericsson

Lars E. Ericsson received his Ph.D. from the Royal Institute of Technology, Stockholm, Sweden, in 1972. He retired from Lockheed Missiles & Space Company in August 1991 and is presently freelancing as an Engineering Consultant in Unsteady Aerodynamics and Structural Dynamics, especially in cases where separated flow has a dominating effect. Dr. Ericsson is a Fellow of the AIAA and has published over 200 papers in his technical fields of interest.

Thomas N. Farris

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 the Ph.D. in 1986 at which time he joined the School of Aeronautics and Astronautics of Purdue University where he is now Associate Professor, teaching courses in tribology, structural analysis, plates and shells, 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 lead to support by NSF through a Presidential Young Investigator Award in 1990 and the ASME Burt L. Newkirk Award in 1992.

Ronald A. Hess

Ronald A. Hess received the B.S., M.S., and Ph.D. degrees in Aerospace Engineering from the University of Cincinnati in 1965, 1967, and 1970, respectively. 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. At NASA he conducted research in the areas of aircraft handling qualities, control/display analysis and design, and manual control. In 1982, he joined the faculty of the Department of Mechanical Engineering at the University of California, Davis, where he is currently a Professor in the Department of Mechanical, Aeronautical, and Materials Engineering. His current research interests lie in the areas of automatic and manual control of aircraft and in man/machine systems.

Dr. Hess is an Associate Fellow of the AIAA, a member of

the IEEE, Sigma Xi, and Tau Beta Pi and is an Associate Editor of the *IEEE Transactions on Systems, Man, and Cybernetics*. He is a Vice-President of the IEEE Systems, Man, and Cybernetics Society and chairman of the Society's Manual Control Technical Committee. He is a member of the Technical Committee on Atmospheric Flight Mechanics of AIAA.

Harry H. Heyson

Harry H. Heyson earned his B.Ae.E., cum laude, at the Polytechnic Institute of Brooklyn in 1949. He received his M.S. in Aeronautical Engineering from Virginia Polytechnic Institute in 1958. He joined the staff of NACA's Langley Laboratory in 1949. His research at NACA and NASA has resulted in 75 papers on the theoretical and experimental aspects of helicopters and V/STOL induced flowfields, ground effects, and wind tunnel wall effects, as well as on innovative new aircraft concepts. He is a frequent lecturer in university short courses and helicopter safety seminars.

After a brief period as an Associate at the Hampton Division of Eagle Engineering, Mr. Heyson has established his own consulting practice specializing in helicopter and V/STOL aerodynamics and wind tunnel wall effects.

Mr. Heyson is an Associate Fellow of AIAA and a member of the American Helicopter Association.

Kenneth J. Holt

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 Lieutenant Colonel and a Command Pilot. His background is in fighters, having flown the F-86, F-100, F-4, F-15, 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 Member of AIAA.

Mahendra C. Joshi

Mahendra C. Joshi is currently Group Leader, Acoustics Technology at Douglas Aircraft Company, Long Beach, California. He received his Ph.D. in Aeronautical Engineering from University of Tennessee Space Institute in 1977. He was a post-doctoral 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 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.

Ching F. Lo

Ching F. Lo is a Professor of Aerospace and Mechanical Engineering at the University of Tennessee Space Institute. He received his B.S. from National Taiwan University, Taipei, Taiwan, in 1959 and his M.S. and Ph.D. degrees from Cornell University in 1964 and 1967, respectively. He joined the research staff of Arnold Engineering Development Center at

Arnold Air Force Base, Tennessee, in 1967. His research involved the development of aerodynamic ground test facilities and testing techniques including Reynolds number effects and wind tunnel wall interference technology for various types of wind tunnels from low speed V/STOL to transonic, supersonic speed and adaptive wall tunnel. He has been responsible for the application of Artificial Intelligence (AI) technology to wind tunnel facilities. As a senior research fellow at NASA in 1987, he initiated an AI application program for the operation of the NASA/ARC wind tunnel facilities in Aerodynamics Division. He assumed his present position at the University of Tennessee in 1988.

Dr. Lo's current interest concerns the development of AI/expert systems for wind tunnel facilities and Space Shuttle, engineering monitoring expert systems, neural network based systems for propulsion, and tunnel wall interference. He is a member of AIAA and a member of the American Association for Artificial Intelligence.

Bellur L. Nagabhushan

Bellur L. Nagabhushan 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 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 Atmospheric Flight Mechanics Technical Committee. He is also a member of the American Helicopter Society. 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.

Thomas M. Weeks

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 Laboratory of Air Force Wright Aeronautical Laboratories. Dr. Weeks is an Associate Fellow of the AIAA.