

Comments on the Need for CFD Code Validation

ACCORDING to the old adage that says with maturity comes responsibility, computational fluid dynamics has reached the age where those who practice it and publish the results of code development and applications must demonstrate the accuracy and value of their work. This issue of the *Journal of Spacecraft and Rockets* is devoted mainly to that topic.

For the AIAA Thermophysics Conference in Buffalo, in June 1989, I was asked to organize a session of invited papers on computational fluid dynamics (CFD) code validation/verification/certification. The session was well attended, with about 200 in the audience throughout the entire session of five papers. I was also impressed with the range and depth of material presented, and I asked the authors to submit their papers to *JSR* for publication in a special section of the journal. I also invited others with papers on CFD code applications to have their papers considered for the special section on code applications.

This issue of *JSR* is intended to focus on the important issue of CFD code validation/verification/certification/application and publication of the research and development results of

those in the business of CFD. I will not try to summarize the papers presented in the issue. Those who are interested are invited to read the papers in their entirety. A brief summary of the papers can be obtained by reading the abstracts written by the authors and glancing over the conclusions of the papers. The authors of the individual papers can summarize their comments and findings far better than I can in this brief forward.

The application papers following the section on code validation/verification/certification show the current state of CFD development and indicate the current level to which authors are applying the ideas and standards suggested in the first section. No particular effort was made to have authors conform to any new standard for publication in *JSR*. I will allow the readers to judge if the authors of the application papers attempt to validate their results as suggested in the first section.

With the publication of these CFD papers, we hope to focus attention on the important issue of testing and validating the results presented at AIAA meetings and published by all AIAA journals.

Introduction of Two New *JSR* Associate Editors

I ALSO wish to take this opportunity to introduce two new Associate Editors of the *Journal of Spacecraft and Rockets*. Since January 1, 1990, we have added Ernest V. Zoby and Earl A. Thornton as AEs for the journal. Vince Zoby will replace me in the area of aerothermodynamics and Earl

Thornton will replace David Allen in structures. Their biographical sketches follow. We welcome them as Associate Editors and thank David Allen for his dedicated service to this journal.

Clark H. Lewis
Editor-in-Chief

EARL A. THORNTON assumed the position of Professor of Mechanical and Aerospace Engineering at the University of Virginia in the fall of 1989. Prior to that time, he was a visiting scholar at the Texas Institute of Computational Mechanics at the University of Texas at Austin, a position he had held since 1987. He received a BS degree in engineering mechanics from Virginia Polytechnic Institute and State University in 1959, an MS degree from the University of Illinois in theoretical and applied mechanics in 1961, and a PhD degree in engineering mechanics from VPI & SU in 1968. From 1969 to 1987 he was a professor in the Mechanical Engineering and Mechanics Department at Old Dominion University. At ODU, Professor Thornton had a long association with the NASA Langley Research Center where he was engaged in a variety of projects. Since 1978 he has been heavily involved in interdisciplinary research on flow, thermal and structural behavior of space structures, and high-speed flight vehicles. Professor Thornton is an Associate Fellow of the AIAA, a past member of the Thermophysics Technical Committee, and is currently a member of the Structures Technical Committee. The author of over 100 engineering publications, he is co-author of the text *The Finite Element Method for Engineers*. He is also currently the director of short courses on thermal stresses and thermoviscoplasticity for the AIAA.

ERNEST V. ZOBY is employed by NASA and has been at the Langley Research Center since 1962. He received his BSME from Virginia Polytechnic Institute and State University and an MS in thermal engineering from Old Dominion University. Mr. Zoby has been responsible for developing and demonstrating the applicability of approximate codes that define the aerothermal environment about spacecraft at both Earth and planetary entry conditions. This work encompassed preliminary design and post-flight heating calculations for the RAM C, Re-entry F, Shuttle, and Venusian and Galileo vehicles. He has over 70 publications in the area of hypersonic aerothermodynamics to his credit, including studies for computing the equilibrium high temperature properties of gas mixtures and for the heat shield performance of entry probes. He is currently the Co-Principal Technologist for the Shuttle Infrared Leaside Temperature Sensing experiment, which provides a detailed mapping of the Shuttle leaside heat rates, and he is a member of the Aerodynamic Technology panel for the National Aero-Space Plane. Mr. Zoby served on the AIAA Thermophysics Technical Committee and is an Associate Fellow of the AIAA.