Book Review

Computational Fluid Mechanics and Heat Transfer, by Dale A. Anderson, John C. Tannehill and Richard H. Pletcher
Hemisphere Publishing Corp., McGraw-Hill Book Company, 1984, 599 pp., $39.95.

Since the late sixties, computational fluid dynamics has undergone a period of rapid growth. A handful of good books in this subject area have been written. However, like any chronicle of a developing scientific discipline, it is nearly impossible to describe collectively the most current developments and the timeless fundamentals while maintaining a comprehsensive and reasonable balance between depth and scope. In this regard, a substantial amount of preparation must be devoted to the evaluation and verification of accumulated materials to be included and incisive judgement in selecting appropriate topics must be consistently exercised to determine the book's lasting value. The reviewer believes this book comes very close to perfection, which by definition is not achievable, and carries all the earmarks of a labor of love and devotion.

The overall organization and structure of this book is impeccable. The first part of this book consists of the basic concepts and fundamentals of finite-difference methods in four chapters. The articulation of science issues is clear. A careful blend of meticulous derivations and statements without proof, but with cited accessible references, is also obvious. The remainder concentrates on applications, starting from a solid foundation of governing equations and turbulence modeling and leading into a series of progressive approximations to the Navier-Stokes or the Reynolds-averaged Navier-Stokes equations. A chapter on grid generation is also included. In that, helpful comments on all the methods in different areas of application are provided by those who possess practical working experience. The authors' understanding and assessment of each special area of application reflects unselfish and earnest sharing of knowledge. Historical footnotes for each specification in solving progressive approximations to the Navier-Stokes or the Reynolds-averaged Navier-Stokes equations reveals a scholarly attitude. In doing so, a very careful attribution to the significant scientific contribution by different individuals has been documented. This book also reaffirms good standards in reference citing, an item that has experienced some degree of deterioration in current literature. Finally, the book represents the pinnacle of synergistic interaction of a wide range of expertise that is unobtainable by a single author. The reviewer still can identify each author's contributions in the book but can hardly note any discernible difference in literary style. The only criticism is that the text contains too limited a coverage of heat transfer to justify an equal billing in the title of the book.

The book is nominally designed for advanced undergraduates or first-year graduate students. The meticulously selected exercises seem to support that. However, the reviewer recommends this book to all students of computational fluid dynamics for its clear articulation of fundamental knowledge in the discipline and the relationship of this information to previous and ongoing work as well as the appropriate use of this learning. In these aspects, the book has few peers. The reviewer believes it would take a lot of painstaking effort and fortitude to write a better book on computational fluid dynamics, if it is possible at all.

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