the boundary-layer differential equations. Included are the effects of suction and injection as well as heat and mass transfer and compressible boundary layers.

The treatment of turbulent boundary layers is preceeded by a discussion of transition including a short outline of stability theory and presentation of experimental information. In turbulent flow, considerable space is provided for the modeling of the turbulent transport process, including time mean flow formulations (models of the inner and outer region), models based on turbulent kinetic energy, on energy and length scale (k-ϵ models), and on Reynolds stress. Chapters are devoted to turbulent-free shear layers, boundary layers with variable density, and heat and mass transfer.

The book presents a well-rounded and up-to-date introduction to our present knowledge of boundary-layer flow and its analysis. The author offers the book as text for upper division undergraduate and first-year graduate courses for mechanical, chemical, aeronautical, civil, and ocean engineering students. This reviewer suspects that the treatment, especially of the turbulent modeling, is too short for students to perform computer analysis of turbulent boundary layers without supporting material.

Some detailed remarks: With the many parameters appearing in the text, it would be helpful to include their definitions in the section "NOTATION" or to refer to the pages where they are introduced. Notations in figures are sometimes not defined (e.g., in Figs. 6-11 and 7-38). The notations in Figs. 1-8, C and D, are identical—what is the difference? Such shortcomings should be removed in a second edition.

In summary, the book is an excellent introduction to boundary-layer theory for those wanting information about our present knowledge of boundary-layer flow and our ability to predict its character. It can also be recommended as a textbook when additional supporting material is provided.

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Difference Methods for Initial-Boundary-Value Problems Flow Around Bodies

You-Lan Zhu, Xi-Chang Zhong, Bing-Mu Chen & Juo-Min Zhang, Springer-Verlag, New York, 1988, 600 pp., $120.00.

This book describes basic techniques for integrating hyperbolic systems of equations (specifically, Euler's equations for inviscid flows, with an emphasis on polytropic gases and some attention paid to real gases). The second part, filling about two thirds of the book, reports applications to blunt-body problems and steady, supersonic, axisymmetric flows.

In our world of glorified obsolescence, the highest merit of this book seems to be historical. Published in Chinese in 1980, it reports work done in the 1970s, when exchanges between China and the Western world practically did not exist. Therefore, the work should be judged as original, and praise is due to the choice of a technique with a sound physical background, able to generate results of the highest accuracy. (Isolation was, perhaps, a positive factor. In an aseptic environment, the basic relevant concepts of domain of dependence and shock-fitting could be analyzed and accepted with ease). My enthusiastic agreement with the authors on matters of principle does not necessarily imply that I agree with the current English translation (that only differs from the Chinese original in some Appendices), and that I consider the book a timely contribution to the state-of-the-art or a useful guide to the numerical gasdynamicist.

Regarding style, this work tends to be overly procedural in nature, a most unfortunate approach for many reasons. First, the basic ideas are drowned by meticulous but unnecesary details. For example, obsessive insistence on proof of stability does not provide a better understanding of a technique and distracts the reader from the main-stream of thought. In general, the book does not succeed in providing inspiration, as it should, but tends to enforce procedures that are not necessarily to be followed literally. In addition, the rare lines of text emerging from the algebraic sea should be completely rephrased to be comprehensible.

Second, ideas that have a right to last should be emphasized, and recipes that depend on the computer state-of-the-art should be updated, or not mentioned at all. For example, the lengthy description of three-dimensional techniques related to the method of lines and to periodical fitting of varibles in the circumferential direction in cylindrical coordinates is, by modern standards, lacking interest: even in 1965 certain simple three-dimensional, time-dependent problems had been treated without giving the circumferential variations a second-class citizenship. With the present computers, assumptions of this kind are out of the question. On the matter of shocks, shock-fitting is the technique proposed, justified, and used in this book. In principle, I agree. However, shock-fitting, using the shocks (and contact surfaces) as boundaries between regions, is the only technique described here. This was the first approach used in the 1960s for simple two-dimensional, time-dependent problems. Currently, shock-fitting can be performed leaving the shocks floating between mesh points, regardless of topological complexities. Finally, the sections on non-equilibrium gases are outdated by the new wave of papers on the subject, prompted by the novel possibilities offered by modern computers.

In conclusion: a book with high merits in the 1970s, and of little interest in the 1990s. I cannot close this review without expressing my disappointment about the book's printing: the typesetting is atrocious, with bold characters interspersed at random throughout the text and other typographical amenities. From Springer-Verlag, who used to set the standards of excellence in printing, a presentation like this falls far below past performances. Considering that the typesetting was entirely done by the authors, one would expect the cost of the book to be in the range of $30, a figure consistent with that suggested by John Lumley in his review of ***Turbulence in Fluids*** (*AIAA Journal,* Vol. 26, No. 10, 1288-89).

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