Progress and Supercomputing in Computational Fluid Dynamics: Proceedings of U.S.-Israel Workshop, 1984. Edited by EARLL M. MURMAN AND SAUL S. ABARBANEL. Birkhäuser, Boston, 1985. x+403 pp. $44.95. ISBN 0-8176-3321-9. Progress in Scientific Computing, Vol. 6.

This book is a collection of twenty papers delivered at a 1984 workshop entitled "The Impact of Supercomputers on the Next Decade of Computational Fluid Dynamics." There is also a paper by the editors that serves as an introduction to the proceedings. In many instances the papers are extended summaries of work reported in detail elsewhere.

The range of subject matter covers a wide spectrum. There are a number of garden variety computational fluid dynamics (CFD) papers. These follow the thesearemyequationsthisismyalgorithmthesearemycomputations format. Ad hoc in nature, they are generally of limited mathematical interest. Among the remaining papers, there is an interesting and very readable one by Glowinski that features a least squares method in the solution of semi-discrete Navier-Stokes approximations. Another by Gottlieb and Tadmor cleverly shows how to recover accurate pointwise values of a discontinuous function from its Fourier partial sums (the idea is to convolute the partial sum against an averaging kernel having adjustable local support). And a paper by Browning and Kreiss concerning stability and regularity properties of solutions of some systems used in numerical weather prediction is impressive for its hard analysis.

The book does not contain any startling revelations on the use of supercomputers in CFD. Perhaps this is why the word "and" rather than the more provocative "in" appears in the book's title. The reader learns that "explicit" algorithms vectorize more easily than implicit ones, and that if an implicit algorithm is to form the basis of the computation, then it should be used in a form in which blocks of unknowns are uncoupled, for example, by iteration or approximate factorization. It is also recommended that graphics environments capable of transforming large data bases into effective flow visualizations be developed along with the supercomputers. This is a need that is obvious to anyone who has tried to extract meaningful conclusions from the tabular data of even a moderately sized CFD simulation. Less obvious is the notion of using the supercomputer in a post-processing mode to diagnose its own output for relevant features of the flow such as shocks and vortices.

This is a work written by specialists for specialists. It represents a timely, though by no means definitive, comment on a subject of continuing importance in engineering and science. CFD aficionados will not ignore it.

THOMAS A. PORSCHING
University of Pittsburgh