J. Fluid Mech. (1987), *vol.* 178, *p.* 567
Printed in Great Britain

REVIEW

Numerical Methods in Fluid Dynamics: Initial and Initial-Boundary-Value Problems. By GARY A. SOD. Cambridge University Press, 1986. 446 pp. £30.00 or $44.50.

This book is more restrictive in scope than might be assumed from the title. First, it is concerned with finite-difference methods only and does not mention other numerical methods. Second, as implied by the subtitle, it considers only parabolic and hyperbolic equations, thereby omitting direct methods for the many steady problems governed by elliptic equations. Third, it is intended to be the first volume of a two-part series, and deals with model equations (e.g. the Burgers equation), and not with the equations governing fluid motion, which will be the subject of the second volume.

There are five chapters: an introduction and a chapter each on parabolic equations, hyperbolic equations, hyperbolic conservation laws and stability in the presence of boundaries. Topics covered include explicit, implicit, Crank–Nicolson, fractional step and ADI schemes, the CFL limit, numerical dispersion and diffusion, and the Monotone, Gudunov and Random-Choice methods. It is the author's declared intention to emphasize concepts and theory, and the book is highly mathematical and much concerned with the formal stability, consistency, and convergence of the various finite-difference equations. In solving these equations, the author is so firmly committed to matrix methods he does not even mention relaxation methods.

This book is meant to be a self-contained text. While it is strong in certain aspects, particularly the stability of the finite-difference methods studied, it would need to be supplemented by other material to give a balanced view of the computational methods presently in use in fluid dynamics.

Finally, unusually for CUP, this book has not been typeset, but has been reproduced photographically from the original manuscript. The result is a cramped and messy layout which is not easy to read. For example, subscripts and superscripts are often uncomfortably close to the adjacent line.

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