Journal of Sound and Vibration (1999) **220**(5), 967–968
Article No. jsvi.1998.2089, available online at http://www.idealibrary.com on IDEAL

BOOK REVIEW

NUMERICAL METHODS FOR WAVE PROPAGATION, 1998, editors E. F. Toro and J. F. Clarke. Dordrecht: Kluwer Academic Publishers. ix + 385 pp. Price (hard cover) NLG 315.00, USD 170.00, GBP 107.00. ISBN 0-792-35125-8.

This book contains many of the papers which were presented at the International Workshop on Numerical Methods for Wave Propagation Phenomena held at Manchester Metropolitan University, U.K., in May of 1995. The last several years have seen substantial interest and progress in the numerical treatment of wave propagation phenomena spurred by applications in aeroacoustics, electromagnetics, and other fields. Hence, the stated goal of the Workshop was to bring the relevant ideas together in one place. In this endeavour, the volume is only partially successful with the work of C. K. W. Tam and his associates at Florida State University on Dispersion Relation Preserving (DRP) schemes being a notable exception.

The book opens with the First Harten Memorial Lecture given by P. L. Roe of the University of Michigan in memory of the late Professor Amiram Harten, developer of the Total Variation Diminishing (TVD) and Essentially Non-Oscillatory (ENO) schemes. Since minimization of numerical dissipation and dispersion are vital to the faithful propagation of waves, Dr. Roe's paper presents his ideas on upwind principles from which he claims that long-range, virtually dissipationless schemes can be constructed. In addition to benchmark acoustic calculations, he also presents applications to dilute gases and magnetohydrodynamics.

Although most algorithm development for wave propagation calculations has thus far relied upon regular grids in order to minimize dissipation and dispersion, such grids are very difficult to employ in the presence of irregular bodies or time-dependent surfaces. Thus, the next paper by M. J. Baines and M. E. Hubbard of the University of Reading discusses multidimensional upwinding schemes with grid adaptation. Example results are presented which show significant versatility and improvement in solution accuracy with grid adaptation.

Other papers in the volume deal with Weighted Average Flux (WAF) and non-conservative schemes, semi-implicit and high-resolution shock capturing methods, Godunov-type schemes at material interfaces, as well as an entropy diminishing criterion for hyperbolic systems and difference approximations on parallel computers. Applications to shock interaction with rigid porous media, sedimentation, geophysical flows, high-speed aerodynamics, two-component flows, ultrasonic testing with cracks, relativistic fluid dynamics simulation of extragalactic jets, and medium-range weather forecasting are also given.

The papers in this volume are generally well-written and highly readable. Although certainly not an exhaustive treatment of computational approaches to

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wave propagation, the book does succeed in bringing together many significant contributions to the subject and is recommended to all those working in this important field.

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