Book Reviews

Shock Waves and Shock Tubes: Proceedings of the Fifteenth International Symposium on Shock Waves and Shock Tubes,

R. A. Daniel Bershader and Ronald Hanson, Editors, Stanford University Press, California, 1986, 922 pp., $49.50.

The subject symposium has convened on a biennial basis since 1957. This symposium is considered to be the leading international forum for the presentation of shock wave related research activities, both fundamental and applied.

The present volume includes 110 contributed papers and 8 invited lectures. The latter features the Paul Vieille Memorial Lecture titled, "The Application of Hook-Method Spectroscopy to the Diagnosis of Shock-Heated Gases" by R.J. Sandeman of the Australian National Laboratory. Also included among the invited lectures is a discussion of a new medical application of focused shock waves—namely the noninvasive fracture of kidney stones—by D.A. Russell of the University of Washington (Seattle). Other invited lectures provide review of shock focusing phenomena, shock waves in low temperature helium, condensed matter at high shock pressure, aeroassisted orbital transfer vehicles, numerical synthesis of molecular spectra, and hydrogen auto-ignition. Contributed papers deal with shock propagation, shock interaction, chemical kinetics, computation and modeling, multiphase and heterogeneous media, and experimental methods.

The volume provides a convenient and valuable source of information on current research activities in the area of shock waves and related physical, chemical, and medical phenomena. It is a worthy library addition for workers in these fields.

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Principles of Combustion, by Kenneth Kuo, John Wiley & Sons, New York, 1986, 810 pp., $54.95.

The first comprehensive book on combustion was written by Lewis and Von Elbe in 1951. Most of the subsequent authors who set out to write general books on combustion produced books that were classified as reference or specialist books. In the meantime the subject of combustion has grown as a result of increased research activity associated with the energy shortage and emission of pollutants. In the 810 pages of this new book Kenneth Kuo provides the most comprehensive textbook directed to the fundamentals of chemically reacting flow systems with application to power production, jet and rocket propulsion, fire prevention and safety, pollution control, materials processing industries, and so on.

This book is one of the very few in combustion that has examples with solutions and homework problems at the end of each chapter. In addition, there are projects related to experiments reported in the literature and assignments associated with each chapter. The book is very well written and organized with important contributions from colleagues and graduate students who provided feedback to the author. Teachers who seek a suitable and satisfactory textbook in combustion, comparable to those of more mature subjects such as fluid mechanics and heat transfer, will find in this book the important elements that make it suitable for recommendation to students.

The emphasis of the book is on theoretical modeling with particular attention to formulation of problems for solution by computers. Background material is provided on chemical thermodynamics, chemical kinetics, and conservation equations for multicomponent reacting flows. Deflagration and detonation waves in premixed gases are examined and special attention is given to deflagration-to-detonation transition. The more classical subjects of premixed laminar flames, laminar diffusion flame jets, and combustion of single liquid drops are well covered. Readers will be especially interested in the newer work on turbulent flames, spray combustion, and burning of solid particles with their associated modeling. The section on chemically reacting boundary-layer flows shows how the advanced concepts in fluid mechanics have been integrated with chemical reaction. The final chapter covers ignition of solid propellants, liquid fuel sprays, and boron particles.

Professor Kuo is to be congratulated on having written the most comprehensive book on combustion that qualifies as a textbook recommended for students.

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