4 Holmes, P. J., "A Nonlinear Oscillator With a Strange Attractor," *Philosophical Transactions of the Royal Society*, London, Series A, Vol. 292, No. 1394, 1979, pp. 419–448.

5 Ueda, Y., Hayashi, C., and Akamatsu, N., "Computer Simulation of Nonlinear Ordinary Differential Equations and Nonperiodic Oscillations," *Elec. and Comm. in Japan*, Series A, Vol. 56, No. 4, 1973, pp. 27–34.

Vibrations of Elastic Structural Members. By Edward B. Magrab. Sijthoff and Noordhoff, Alphen aan den Rijn, The Netherlands. 1979. Pages 400. Price $60.

REVIEWED BY A. LEISSA[2]

The book is of broader scope than the title implies, for considerable attention is also devoted to general, dynamic response, as well as vibratory response, and to wave propagation. The work is divided into chapters as follows:

I	Some Mathematical Preliminaries; 45 pages.
II	Vibrations of Strings; 27 pages.
III	Vibration of Membranes; 20 pages.
IV	Flexural Vibrations of Beams—Part I: Bernoulli-Euler Theory; 78 pages.
V	Flexural Vibrations of Beams—Part II: Timoshenko Theory; 44 pages.
VI	Vibrations of Plates—Part I: Thin Plate Theory; 58 pages.
VII	Vibrations of Plates—Part II. Mindlin—Timoshenko Theory; 36 pages.
VIII	Vibrations of Shells: General Theory for Shells of Revolution; 17 pages.
IX	Vibrations of Cylindrical Shells; 29 pages.
X	Vibrations of Spherical Shells; 19 pages.

The first chapter presents an excellent discussion of orthogonal functions, a summary of their orthogonality properties and how they may be determined and utilized, as well as other mathematical topics frequently referred to later in the book. Subsequent chapters are typically each further divided into sections dealing with (and in this order): derivation of the governing differential equation and boundary conditions (from Hamilton's principle); interpretation of the boundary conditions; boundary conditions and generation of normal modes; wave propagation and dispersion; free vibrations for certain classical problems; and forced and aperiodic motion.

Although no homework problems are given, the reviewer would definitely recommend the book for a first, graduate level course in dynamics of continuous, elastic systems, as well as to the reader desiring otherwise to broaden the scope of his/her understanding of the subject. The work is carefully done, and adequate reference to the voluminous literature of the field is given.

Numerical Methods in Fluid Dynamics. Edited by H. J. Wirz and J. J. Smolderen. McGraw-Hill Book Co., Hightstown, N. J. 1979. Pages xiii-399. Price $35.

REVIEWED BY E. M. MURMAN[3]

This book is a publication of six lectures presented at the von Karman Institute. Each lecture was given by a noted authority in the field and represents an up-to-date description of the topic. The editing and printing of the book is of high quality.

Three of the chapters are on various aspects of transonic flow computations. A chapter by Jameson presents an excellent article on the computation of steady transonic flow problems. Starting from the small disturbance equation, the numerical methods are developed for the exact potential equation. Results for two and three-dimensional flows are presented. The chapter by Ballhaus summarizes recent progress in the computation of transonic flow for three-dimensional shapes using the small disturbance theory and for unsteady transonic flow. Several design applications using numerical optimization are also presented. The chapter by Schmidt focuses on various approaches for computing wing body problems of interest to the aerodynamic designer.

A chapter by Kraus discusses panel methods and illustrates the degree of complexity in the geometrical problems which can now be computed. A section is included on nonlinear vortex wake methods.

Two chapters deal with computing viscous flows. At one end of the spectrum, incompressible laminar flows occurring in physiological problems are discussed by Mueller. The complicated geometries which must be treated are of primary concern in this work. Mueller notes that for this speed regime, numerical computations are perhaps easier than experiments. The other chapter by Belotserkovskii summarizes several areas of high speed viscous flow.

In summary the book appears to be a valuable addition to the archival literature in this area.

High Velocity Deformation of Solids. Edited by K. Kawata and J. Shioiri. Springer-Verlag, Berlin, Heidelberg, New York. 1978. Pages xviii-452. Price $42.90.

REVIEWED BY T. NICHOLAS[4]

The high velocity deformation of solids has been the subject of periodic national and international conferences and symposia over the past several decades. The most recent symposium in this specialized technical area was held in Tokyo, Japan, in Aug. 1977. The papers presented at this IUTAM sponsored symposium are presented in a single volume and cover the subjects of theory and experiment, micro, and macromechanisms, and applications to a variety of materials. The emphasis, throughout, is on material behavior rather than on structural response. Works from a number of different countries are represented and provide a global view of the state-of-the-art in this subject area. As such, the subject book is one of the premiere references in the field of impact mechanics. For the U.S.A. audience, it is one of the rare opportunities to learn of the extent and nature of work being carried out in the host country, Japan, as well as Great Britain, France, USSR, Poland, and other countries. These works are normally not readily available to the English speaking audience.

The book consists of 39 papers ranging in size from 4 one page summaries to a comprehensive treatment of ricochet of spherical ended projectiles by Johnson and Daneshi. Drucker presents a clever approximate solution to spall and cratering problems that are otherwise mathematically intractable. There is a detailed study of friction and inertia in the Hopkinson bar by Klepaczko and Malinowski. Hayashi and Tanimoto present some interesting dynamic biaxial data on aluminum. And Lindholm discusses deformation maps at high dislocation velocity. In total, 24 of the papers represent invited presentations by experts from around the world. Space limitations preclude extensive detail in most papers and necessitate very small figures in some instances. However, this collection of papers is extremely comprehensive in scope and represents the works of the top people both here and abroad as a scan of the table of contents will quickly

---

[2] Professor of Engineering Mechanics, Ohio State University, Columbus, Ohio 43210.

[3] Vice President, General Manager, Flow Research Company, 21414 68th Avenue South, Kent, Wash. 98031.

[4] U.S. Air Force, Air Force Materials Laboratory, Wright Patterson AFB, Ohio 45433.

reveal. The subject matter covered includes deformation and fracture of materials under dynamic loading, stress wave propagation, impact phenomena, and mathematical analysis methods. Both experiments and theory are well represented. What is especially appealing about the theme of this conference is the attention paid to fundamental micromechanisms and their relation to macroscopic behavior of high velocity deformation and fracture.

There are a few minor drawbacks to this otherwise outstanding volume. The translation of the Japanese papers into English is not of the highest quality, but all are readable. Hand drawn and untitled figures in one paper are inexcusable. A discussion section is presented at the end which a clever reader can relate back to the subject paper through a not very apparent numbering scheme. Overall, however, this is one of the classic references in the subject area and is mandatory reading for those working in the field of high velocity deformation of solids who were unable to attend the symposium in Tokyo.