BOOK REVIEWS

approaches which are used to assess the stability of elastic structures under conservative loads. In his designation, these are from the point of view of static bifurcation, dynamics, potential energy, and imperfection analysis. A qualitative discussion of postbuckling behavior is also given in connection with the simple models. After this introduction the book goes on to columns, frames, columns on elastic foundations, rings, and arches. A number of specific problems in each category are treated. Problems are assigned at the end of each chapter. Except for a snap-through analysis of a shallow arch, the emphasis in almost all cases is on problems involving a bifurcation point. The analysis of each problem is generally quite clearly laid out and should be easy for a student to follow. A discussion of energy-based calculational methods is included. The author gives a discussion of five such methods which he labels methods of Timoshenko, Rayleigh-Timoshenko, Rayleigh-Ritz, Trefftz, and Galerkin. Here a student may become confused because the close mathematical interconnection among these methods is not clearly brought out. There is no important distinction between several of them. A short last chapter emphasizes, by way of two examples, that a dynamic approach must be used to analyze problems involving nonconservative loads.

In summary the book covers mainly classical topics, although recently acquired understanding is weaved into the background discussion. It doesn't touch on plates or shells but this is not unreasonable for a self-contained introductory text. No chapter deals with any of the numerical methods such as finite differences or finite elements which have had such an impact on the calculation of buckling loads. Aside from this one possible omission the book should be useful as the basis of an undergraduate course or a portion of a graduate level course on structural stability.

The second article by A. S. Argon covers different modes of failure of a restricted group of laminar composites. The treatment is statistical in nature beginning with the effects of an isolated failure, then followed by the statistical sequential process of subcritical crack growth leading to general fracture instability. V. K. Tewary and R. Bullough present a theory of elastic wave propagation in composite materials in the fourth article. This theory is based on the Born-Von Karman model for a discrete lattice and considers the propagation of elastic waves of wavelength of the order of the fiber spacings. This enables the determination of such critical parameters as the bond strength. Hasson and Arsenault review a large body of information on internal friction data of b.c.c. ternary alloys. The objective is to elucidate information on substitutional-interstitial solute interactions in b.c.c. matrix and then evaluate their role in the phenomenon of solid solution softening. A discussion of relevant mechanical properties in conjunction with the internal friction data would have been very appropriate to the general theme of the paper. Quantitative treatment of microstructures of multiphase materials is becoming increasingly popular with the advent of automatic microstructure analyzing microscopes. The quantitative treatment of the dynamics of microstructural change by R. T. De Hoff is a useful contribution in the area of characterization of the evolution of microstructure. The final article is by R. W. Haskell and J. G. Byrne and deals with the subject of chemical vapor deposition. This is a fairly specialized field in the area of materials processing and would have been more appropriate in another volume dealing exclusively with specialized material processing techniques. The paper, nevertheless, provides useful information on tungsten chemical vapor deposition for engineers involved in this field.

Treatise on Materials Science and Technology. By H. Herman. Vol. 1. Academic Press Inc., Publishers, 111 5th Avenue, New York, N. Y. 10003, Cost $18.50. 346 Pages.

REVIEWED BY T. MURA[6]

This first volume of the series — Treatise On Materials Science and Technology —presents a variety of topics in materials science and engineering by different authors. In the words of the editor, the objectives of these volumes are to present fundamental properties and characterization of wide ranging materials so as to establish an association between the science and technology of materials. In this volume most of the topics covered are in the area of composite materials including energetics of interfaces (Article 1) quantitative treatment of microstructures (Article 5), and mechanical properties (Articles 2 and 3). It would have been desirable for the whole volume to have been devoted to this important class of materials. In this sense the inclusion of Article 4 on interstitial interactions in b.c.c. alloys and Article 6 on chemical vapor deposition in the same volume is surprising. The articles appear to be quite selective in their content and treatment and hence are more appropriate as good reference papers rather than general review papers presenting the state of the art in the particular field.

In Article 1, W. A. Tiller discusses the energetics, kinetics, and topography of interfaces. The treatment here is atomistic in nature rather than phenomenological. It should, therefore, be of interest to solid state physicists and physical metallurgists involved in mechanism studies of phase transformations and surface reactions.

Review of Continuum Physics. Edited by A. Cemal Eringen. Volume 2. Academic Press Inc., New York, N. Y. Publication Date: February, 1973. Cost $49.00.

REVIEWED BY L. WHEELER[7]

Although referred to in the Preface as the second volume of a treatise, this book is a loosely coordinated collection of articles. It does not conform to the notion of a treatise in the traditional sense.

The articles are divided into three groups: Basic Principles, Constitutive Equations, and Methods of Solution. The first part offers nothing new, being in essence a textbook-level description which can be found in a number of other readily available sources.

The second part is the most significant part of the book. In addition to being well written, the articles in this part comprise an integrated and reasonably comprehensive discussion of recent contributions to the literature.

The last portion of the book contains an excellent article bearing the title Singular Surfaces and Waves. But in addition, it contains one called Complex Function Technique that seems out of place. Considering that the third part of the book is supposed to deal with methods of solution, it has to be regarded as a disappointment. Perhaps one would hope to instead see a discussion of the formulation of boundary-value problems, initial-value problems, and history-value problems, as well as results on the uniqueness, stability, and existence of solutions.

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[6] Professor, Northwestern University, Department of Civil Engineering, Technological Institute, Sheridon, Evanston, Ill.

[7] Associate Professor, University of Houston, Department of Mechanical Engineering, Houston, Texas.