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Book Reviews

The Behavior of Thin Walled Structures, Beams, Plates, and Shells, by J. R. Vinson. Kluwer Academic Publishers, Dordrecht, The Netherlands, 1989.

REVIEWED BY S. ABRATE[1]

This is a relatively small book (182 pages) but it is also of wide scope. It is intended to be used as a teaching text or guide for self-study and not as an exhaustive compilation of research results in this area.

Static deformations, thermal stresses, buckling, and free vibrations are treated for beams, rectangular and circular plates, and circular cylindrical shells. Isotropic linear elastic material behavior is assumed, and the reader is referred to another text by the same author for a treatment of laminated composite structures. The effect of shear deformation and rotatory inertia is neglected. To save time, some derivations are not presented; for example, the derivation of the equations of motion for a cylindrical shell are simply given as a starting point for the treatment that follows. In these cases, the reader can refer to the original research papers or to another text for which references are given. The approach taken is that while the literature on a given topic is usually voluminous, an introductory treatment is presented, and results are presented for common practical cases. For certain topics, only a general approach to the problem is given. For example, three pages are devoted to the vibration of cylindrical shells and the vibration of beams and plates is treated in five pages.

This book is very well written; the fundamental behavior of plates and shells is presented with an emphasis on physical behavior rather than mathematical intricacies. Basic assumptions in the development of equations of motion and boundary conditions are discussed, and methods for the solution of practical problems are clearly shown. For all but one of the 12 chapters, several carefully selected homework problems are given with the answers to most of these problems given in Appendix 2. This book is highly recommended as a text for a first course on plates and shells with emphasis on engineering applications. It can also be used for self-study and will provide a solid background for further learning.

Mécanique Vibratoire (Mechanical Vibrations), by M. Del Pedro and P. Pahud. Presses Polytechniques Romandes, 1989.

REVIEWED BY S. ABRATE[1]

This book deals with the vibration of discrete mechanical systems and is intended to be used as a textbook for a first course on the subject. Roughly half the book is devoted to analysis of the vibration of a single degree-of-freedom system. After a brief introduction and a general discussion of one degree-of-freedom systems, Chapter 3 deals with free vibration analysis of conservative and damped oscillators including viscous and dry damping. Steady-state response to a harmonic excitation is treated in Chapter 4 and steady-state response to a general periodic function using Fourier series expansions is presented in Chapter 5. In Chapter 6, transient response is determined using Laplace transforms and also using Fourier Transforms. Analogies with electrical circuits are briefly mentioned in Chapter 7.

The rest of the book treats the vibration of multi-degree-of-freedom systems starting with two degrees-of-freedom systems in Chapter 8, applications to the analysis of vibration absorbers in Chapter 9, and general discussion of multi-degree-of-freedom systems in Chapter 10. Chapters 11 and 12 cover the free vibration analysis of such systems and shows how modal analysis is used to uncouple the equations of motion. The analysis of transient response using modal analysis is treated in Chapter 13. The overall style is introductory, and presentation of the different topics is self-contained.

The discretization of distributed systems (beam, plates, shells) is not covered and the equations of motion for the multi-degree-of-freedom system are assumed to be given. Another criticism would be that numerical techniques of solving eigenvalue problems are not mentioned. These two drawbacks, which are common to many textbooks, may give the mistaken impression that the material presented here is of limited applicability because it cannot be applied to many important cases or that the equations obtained are too difficult to handle. This situation could easily be remedied.

The book is well written, uses clear standard notation, and is very well produced. One strength of the book is that for each section, several well-chosen practical examples are treated in detail. While it can be compared to several of the many existing introductory textbooks written in English, this book rates as one of the best written in French.

Knowledge-Based Control with Application to Robots (Lecture Notes in Control and Information Sciences), by C. W. de Silva and A. G. J. MacFarlane. Springer-Verlag, Berlin, 1989.

REVIEWED BY C. B. BROWN[2]

These lecture notes, which originated in the collaboration of the authors at Cambridge, present a view of robot control which consists of a crisp servo-control level, a knowledge-based inference system for each degree-of-freedom of the robot, and

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