



Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Journal of Sound and Vibration

journal homepage: www.elsevier.com/locate/jsvi



Book Review

Nonlinear Vibrations and Stability of Shells and Plates, Marco Amabili. Cambridge (2008). pp. xvi+374, Hardback, ISBN 978-0521-88329-0

The book is a unique monograph on nonlinear vibrations of shells and plates. The presentation starts with a thorough derivation of all commonly used shell theories from the basics of elasticity theory. In contrast to other books on the subject, like for example the book of Soedel, the derivations of the theories are repeated and not simplified from the general setting of a doubly curved shell under large deflection. This has the advantage that the different sections can be read independently but on the other hand yields a less compact presentation. In the sequel an introduction to nonlinear dynamics is given which is astonishingly complete for only 30 pages and makes the book more complete especially for students.

The following chapters contain a wealth of interesting dynamical problems which are carefully analyzed and in many cases compared with experimental results. In most cases, different settings of boundary conditions are discussed and several modeling approaches are compared. The range of problems studied goes from very classical problems like rectangular plates to problems of fluid–structure interaction, laminated shells and rotating disks. Whereas in the first four chapters all underlying assumptions have been carefully explained, the derivations for the more sophisticated applications are necessarily much less extensive and therefore most beneficial only to readers already experienced in the field.

A second focus of the non-introductory chapters of the book lies on analysis techniques for nonlinear partial differential equations for mechanical systems such as proper orthogonal decomposition and nonlinear normal modes. A very valuable chapter is the chapter on the R-function method for meshless discretization of plates and shells of complex shape developed by Rvachev which currently is not very well known in the western research community.

Summarizing, the book is very carefully and well written and is a pleasure to read, although in some places the usage of index notation would have been more convenient for the reader. The design of the book is very appealing with photos of rockets, bridges and other engineering applications. It should however be noticed that the content of the book is more scientific with many equations and experiments which are conducted in a laboratory environment to assure a good agreement between theory and practice. In the reviewer's opinion, the goal of the book is met to attract researchers, professionals, students and instructors at the same time. The book gives an excellent survey of the state of the art in nonlinear vibrations of shells and plates including many references and therefore is recommended to anyone starting to explore this field. Due to the enormous scope of material covered, the book is more suitable as a reference book than a textbook for graduate courses. The presentation of the material is such that it can be read by anyone with an undergraduate background in engineering, applied mathematics or physics.

Gottfried Spelsberg-Korspeter*
Department of Mechanical Engineering,
Dynamics and Vibrations Group,
Technische Universität Darmstadt,
Hochschulstr. 1, 64289 Darmstadt, Hessen, Germany
E-mail address: speko@dyn.tu-darmstadt.de

Available online 21 December 2009

* Tel.: +49 6151 7058282; fax: +49 6151 705395.