Book Reviews

R. D. Mindlin, An Introduction to the Mathematical Theory of Vibrations of Elastic Plates, edited by Jiashi Young, World Scientific Publishing Co. Pte. Ltd., Singapore 2006, 190 pp., GBP 25.00, ISBN 981-270-381-0

2006 is the one hundredth anniversary of the birth of the late Prof. Raymond D. Mindlin. The formal publication of this book, based on a 1955 monograph by Mindlin prepared for U.S. Army signal Corps Engineering Laboratories, is a personal effort of the editor Jiashi Young for this occasion. This book by the late R.D. Mindlin is destined to because a classic introduction into the mathematical aspects of the two-dimensional theories of elastic plates.

The book systematically derives the two-dimensional theories of anisotropic elastic plates from the variational formulation of the three-dimensional theory of elasticity by power series expansions in the plate thickness coordinate. The uniqueness of the solutions of the two-dimensional equations is also examined from the variational viewpoint and the accuracy of the two-dimensional equations is judged by comparisons between the dispersion relations of the specific waves that the two-dimensional theories are supposed to describe with the prediction by the three-dimensional theory in the frequency-wave number range of interest.

The book mainly discusses dynamic problems but in addition to the low-frequency waves like extension and flexure useful in classical structural engineering, Mindlin also discusses high-frequency waves including thickness-shear and thickness-stretch.

There are mainly aspects of plate theories that Mindlin knew more than anybody also then and now. Therefore the book of Mindlin has been a major reference for researchers of acoustic wave devices for half a century and will remain so in future. It is one of the classical books in mechanics. A list for errors in the original manuscript and their corrections prepared by Prof. Peter C. Y. Lee has been partially taken into consideration in the preparation of this edition.

The short preface of Mindlin is a summarized description of the history of plate theories. Chap. 1 introduces the elements of the linear theory of elasticity, Chap. 2 the solutions of three dimensional equations, Chap. 3 infinite power series of two-dimensional equations, Chap. 4 zero-order approximations, Chap. 5 first-order approximation, and Chap. 6 intermediate approximations. A list of references and of applications of the first-order plate approximation is the closing of the classical book. Jiashi Young adds a biographical sketch of R.D. Mindlin and a list of students of Mindlin.

The new edition of Mindlin‘s famous book may be useful for students and lectures in applied mechanics and structural engineering as well as for research the foundations of theory of acoustic wave devices.

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