



Nonlinear Problems of Elasticity (Applied Mathematical Sciences)

By *Stuart Antman*

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Enlarged, updated, and extensively revised, this second edition illuminates specific problems of nonlinear elasticity, emphasizing the role of nonlinear material response. Opening chapters discuss strings, rods, and shells, and applications of bifurcation theory and the calculus of variations to problems for these bodies. Subsequent chapters cover tensors, three-dimensional continuum mechanics, three-dimensional elasticity, general theories of rods and shells, and dynamical problems. Each chapter includes interesting, challenging, and tractable exercises.

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Editorial Review

Review

From the reviews of the second edition:

"This second edition accounts for the developments since the first edition was published, and differs from the first edition in many points. The book has been reorganized and several parts have been added. ... The already impressive body of references has been further expanded. The reviewer highly recommends this book both to graduate students and to scholars interested in the theory of elasticity." (Massimo Lanza de Cristoforis, *Mathematical Reviews*, Issue 2006 e)

"The second extended edition of the reviewed monograph gives a fundamental presentation of problems of nonlinear elasticity. Every chapter is equipped by instructive exercises, unsolved problems and exhaustive historical comments. The book could be very useful to applied mathematicians and engineers using in their works the elasticity theory and ... to specialists dealing with applications of differential equations and bifurcation theory." (Boris V. Loginov, *Zentralblatt MATH*, Vol. 1098 (24), 2006)

"Antman's impressive work is ... a comprehensive treatise on nonlinear elasticity and a quintessential example of applied nonlinear analysis. ... The text has been revised and updated, Several new sections have been added ... This book is a 'must' for researchers and graduate students interested in nonlinear continuum mechanics and applied analysis. The work is scholarly and well written. ... 'This book is directed toward scientists, engineers, and mathematicians who wish to see careful treatments of uncompromised problems.'" (Timothy J. Healey, *SIAM Review*, Vol. 49 (2), 2007)

From the Back Cover

This second edition is an enlarged, completely updated, and extensively revised version of the authoritative first edition. It is devoted to the detailed study of illuminating specific problems of nonlinear elasticity, directed toward the scientist, engineer, and mathematician who wish to see careful treatments of precisely formulated problems. Special emphasis is placed on the role of nonlinear material response. The mathematical tools from nonlinear analysis are given self-contained presentations where they are needed. This book begins with chapters on (geometrically exact theories of) strings, rods, and shells, and on the applications of bifurcation theory and the calculus of variations to problems for these bodies. The book continues with chapters on tensors, three-dimensional continuum mechanics, three-dimensional elasticity, large-strain plasticity, general theories of rods and shells, and dynamical problems. Each chapter contains a wealth of interesting, challenging, and tractable exercises.

Reviews of the first edition:

"A scholarly work, it is uncompromising in its approach to model formulation, while achieving striking generality in the analysis of particular problems. It will undoubtedly become a standard research reference in elasticity but will be appreciated also by teachers of both solid mechanics and applied analysis for its clear derivation of equations and wealth of examples." --- J. M. Ball, (*Bulletin of the American Mathematical Society*), 1996.

“It is destined to become a standard reference in the field which belongs on the bookshelf of anyone working on the application of mathematics to continuum mechanics. For graduate students, it provides a fascinating introduction to an active field of mathematical research.” --- M. Renardy, (SIAM Review), 1995.

“The monograph is a masterpiece for writing a modern theoretical treatise on a field of natural sciences. It is highly recommended to all scientists, engineers and mathematicians interested in a careful treatment of uncompromised nonlinear problems of elasticity, and it is a ‘must’ for applied mathematicians working on such problems.” --- L. v Wolfersdorf, (Zeitschrift für Angewandte Mathematik und Mechanik), 1995.

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