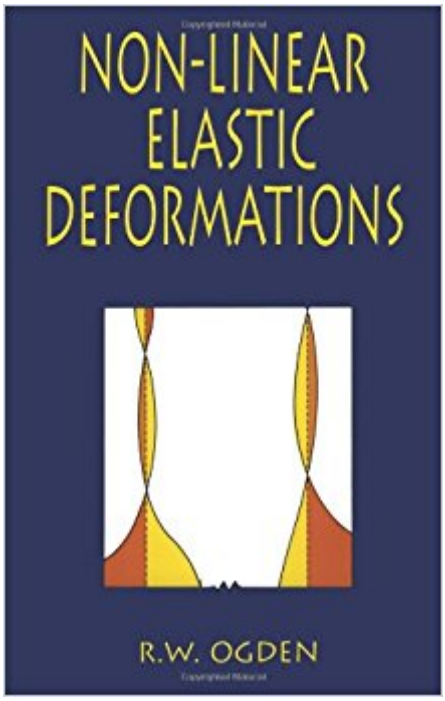
Non-Linear Elastic Deformations (Dover Civil And Mechanical Engineering)



Synopsis

This meticulous and precise account of the theory of finite elasticity fills a significant gap in the literature. The book is concerned with the mathematical theory of non-linear elasticity, the application of this theory to the solution of boundary-value problems (including discussion of bifurcation and stability) and the analysis of the mechanical properties of solid materials capable of large elastic deformations. The setting is purely isothermal and no reference is made to thermodynamics. For the most part attention is restricted to the quasi-static theory, but some brief relevant discussion of time-dependent problems is included.Especially coherent and well written, Professor Ogden’s book includes not only all the basic material but many unpublished results and new approaches to existing problems. In part the work can be regarded as a research monograph but, at the same time, parts of it are also suitable as a postgraduate text. Problems designed to further develop the text material are given throughout and some of these contain statements of new results.Widely regarded as a classic in the field, this work is aimed at research workers and students in applied mathematics, mechanical engineering, and continuum mechanics. It will also be of great interest to materials scientists and other scientists concerned with the elastic properties of materials.

Book Information

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Customer Reviews

It is easy to see why other reviewers do not like this book: it is very advanced. It is not for an

undergraduate, and probably not for a graduate student unless she or he is already very familiar with elasticity and solid mechanics. It is not, at bottom, a text for learning the rudiments of the theory of elasticity: it is more on the level of a research monograph, and Malvern or Fung are better choices for many students. However, Ogden is probably the best work available (other than perhaps Truesdell, who can be an acquired taste) on the rigourous theory of non-linear elasticity. If you have an interest in the structure of constitutive relations, need a rigourous mathematical reference for finite element modeling, or are interested in exploring the assumptions and limitations of the linearised theory of elasticity, Ogden is not just the best place to start, but possibly the only place to go.

This is one of the best contemporary books in solid mechanics. This is the book for people who have read other continuum mechanics/elasticity books and wondered "but why?". You really should be motivated and solve the problems too. Every line of the book is written for a purpose. I find something new every time I read it. If you don’t understand something on first try, go on to the next section and return later.Prof. Ogden is a mathematician. But for a mathematician, his book is very physically motivated. He also gives physical interpretation for most of the mathematical results he derives. The cute part of this book is, although this book is more mathematical than most books engineers would read, it looks like Ogden wants to also flaunt his mathematical credentials. He gives a physical definition in the body of the book and provides a corresponding abstract mathematical definition in the footnotes.If you are interested in finite deformation and hyperelasticity and constitutive relations, this is the book. The distinction he makes between Cauchy and Green elasticity is one of the good one I have come across.This is not for undergraduates (unless one has a very good mechanics and mathematics background). I doubt if it is suitable as a first graduate book either. As a second graduate course or for self study after a course in elasticity/continuum mechanics/solid mechanics, this book is a gem!

Holzapfel covers the same topics (rubber elasticity) and is an easier read with only slightly less rigor. That said, I do agree with a previous reviewer (Temesgen), who said that this Ogden text is for those who’ve read books like Holzapfel and still wonder "but why?" about a certain topic. My "but why?" question had to do with improving my understanding of the underlying assumptions in the popular rubber models (e.x. where does the Mooney-Rivlin strain-energy function actually come from?) -- Prof Ogden did not disappoint. Oh, and if you’re interested in the famous "Ogden" material model, this text will have what you’re looking for... needless-to-say..Two big negatives to this text: 1)

it doesn’t have the more modern material models (obviously -- e.x. Yeoh) and 2) the math jargon is a little much for me -- but I’ve seen much "worse."

This is great book for someone who knows elasticity and some continuum mechanics. recommended for graduate students who will pursue research requiring nonlinear elasticity. For average course on elasticity, this might not be the best book.