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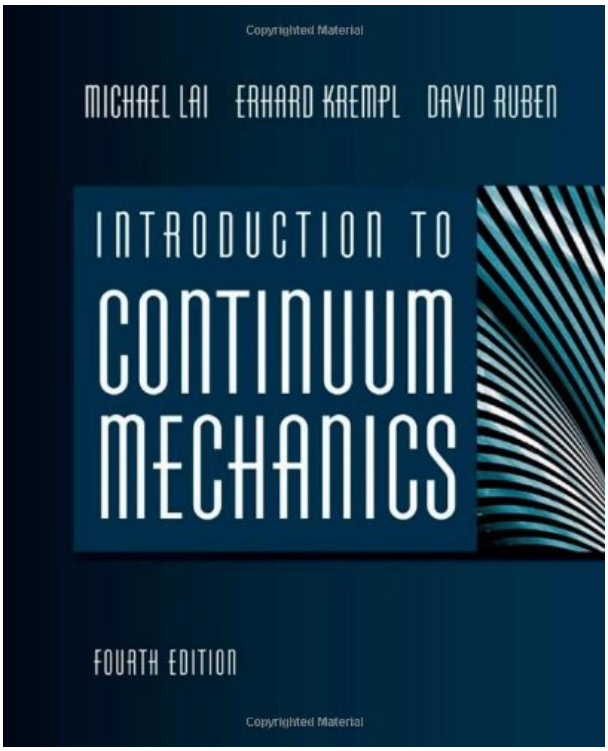

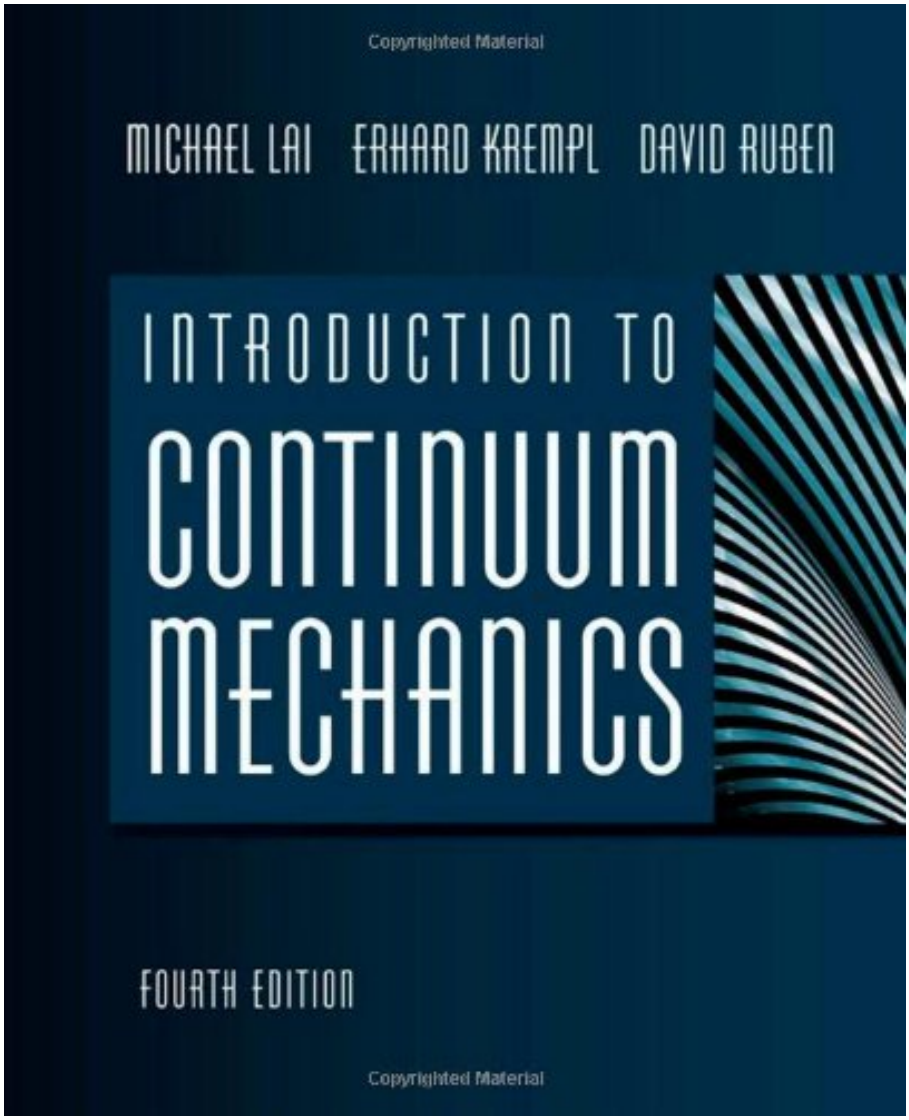

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Continuum Mechanics is a branch of physical mechanics that describes the macroscopic mechanical behavior of solid or fluid materials considered to be continuously distributed. It is fundamental to the fields of civil, mechanical, chemical and bioengineering. This time-tested text has been used for over 35 years to introduce junior and senior-level undergraduate engineering students, as well as graduate students, to the basic principles of continuum mechanics and their applications to real engineering problems. The text begins with a detailed presentation of the coordinate invariant quantity, the tensor, introduced as a linear transformation. This is then followed by the formulation of the kinematics of deformation, large as well as very small, the description of stresses and the basic laws of continuum mechanics. As applications of these laws, the behaviors of certain material idealizations (models) including the elastic, viscous and viscoelastic materials, are presented.

This new edition offers expanded coverage of the subject matter both in terms of details and contents, providing greater flexibility for either a one or two-semester course in either continuum mechanics or elasticity. Although this current edition has expanded the coverage of the subject matter, it nevertheless uses the same approach as that in the earlier editions - that one can cover advanced topics in an elementary way that go from simple to complex, using a wealth of illustrative examples and problems. It is, and will remain, one of the most accessible textbooks on this challenging engineering subject.

- Significantly expanded coverage of elasticity in Chapter 5, including solutions of some 3-D problems based on the fundamental potential functions approach.
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- Seven new appendices appear at the end of the relevant chapters to help make each chapter more self-contained
- Expanded and improved problem sets providing both intellectual challenges and engineering applications

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Most helpful customer reviews

12 of 13 people found the following review helpful.
Yes, this is a very good book.
By P. Lucht
Knowing nothing about continuum mechanics, I read this entire book in 2012 and found it to be excellent. For sure, the math is non-trivial, but is pretty much all derived in Chapter 2, a sort of tensor boot-camp for would-be readers, where things are done in Cartesian, spherical and cylindrical coordinates. Admittedly I already knew much of this stuff, but not all of it. The book is populated with many nuts and bolts examples which bring esoteric concepts down to earth. The examples are rather sly in that seemingly obscure results of earlier examples are applied in later examples, sometimes far down the road. There are also many problems for the reader to solve, though I confess I did only a few. The text develops the general theory of dealing with "particles of continuous matter" (solid or fluid). Chapter 3 treats strain, then Chapter 4 does stress. Up to this point things are general, but then Chapter 5 applies the theory to elastic solids, providing a mini-textbook on this subject, beams and torsion and all that good stuff. Some material on anisotropic solids and large deformations is included at the close. Chapter 6 then changes the focus from solids to Newtonian viscous fluids (like water and air) and the non-linear Navier-Stokes equations are derived. The whole subject of boundary layers and Reynolds numbers and the lift of airplane wings is pretty much skipped over, the reader must find other books on these traditional subjects. I was a bit disappointed, but the book after all is an "introduction". No Magnus Effect for curving baseballs and top-spinning tennis balls. Instead, in Chapter 7 the reader gets a nice treatment of the Reynolds Transport Theorem which shows how to replace time derivatives of material-volume integrals with control-volume integrals. The five guiding conservation principles (mass, linear and angular momentum, energy and entropy) are derived here for the third time in the book. The problem of a rope hanging over the edge of a table (treated as a fluid) demonstrates the control volume method. In the middle of all this action descends a discussion of non-inertial reference frames and then the classic rotating lawn sprinkler is treated with a rotating control volume. Finally, Chapter 8 concerns non-Newtonian fluids, those that have both viscous and elastic properties. Along the way, the reader learns about synovial fluid's impressive viscosity decrease with shear rate, and the effect of human age on this fluid. Mr. Lai spent much of his career on biological applications of continuum mechanics. Since this is a fourth edition book (first was 1974), the authors are in "senior status" (Prof. Krempl died in 2010) and one suspects that much of their accumulated teaching wisdom is embodied in this text. I have put some minor errata up on the web (search Phil Lucht). This 500-page text gets five stars, but requires serious disciplined effort on the reader's part.

3 of 3 people found the following review helpful.
This book is great for and introductory course.
By Guillermo Emilio Aldana-Calderon
This book is great for and introductory course. The examples convey the ideas, the tensor analysis is developed throughout the text but it is not excessive (the good lord knows Tensors can be one or two courses on their own). The problems at the end of the chapter are ALL workable, and each of them makes you use some of the analysis developed. That tells me that the author has been around teaching many, many years, and is really interested in the students gathering a solid understanding of continuum mechanics. This book would be useful for folks that have switched fields (a EE/ME/Aero turned acoustician, or turned Material Scientist), who went through the standard curriculum (continuum mechanics has been historically taught by its own department -say at U of I, you can get a PhD in the field) or in the Aerospace. Once thought a "dead" field - sensors, and smart materials force the folks to either review or learn (like me).

3 of 3 people found the following review helpful.
Great book
By Texas farmer
After looking over a dozen of books on this topic, I have settled down on this one and almost finished it. It is easy for self-study with bounty of examples to help you further understand and master the abstract concepts.

I can't believe the guy's attack on this book saying that this book is an insult for experts. What is your name, are you Albert Eistein?

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