Introduction To Continuum Mechanics Lai 4th Edition

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Continuum Mechanics - P. Chadwick 2012-08-08
DIVComprehensive treatment offers 115 solved problems and exercises to promote understanding of vector and tensor theory, basic kinematics, balance laws, field equations, jump conditions, and constitutive equations. /div
Advanced Mechanics of Materials and Applied Elasticity - Ansel C. Ugural 2011-06-21
This systematic exploration of real-world stress analysis has been completely updated to reflect state-of-the-art methods and applications now used in aeronautical, civil, and mechanical engineering, and engineering mechanics. Distinguished by its exceptional visual interpretations of solutions, Advanced Mechanics of Materials and Applied Elasticity offers in-depth coverage for both students and engineers. The authors carefully balance comprehensive treatments of solid mechanics, elasticity, and computer-oriented numerical methods—preparing readers for both advanced study and professional practice in design and analysis. This major revision contains many new, fully reworked, illustrative examples and an updated problem set—including many problems taken directly from modern practice. It offers extensive content improvements throughout, beginning with an all-new introductory chapter on the fundamentals of materials mechanics and elasticity. Readers will find new and updated coverage of plastic behavior, three-dimensional Mohr's circles, energy and variational methods, materials, beams, failure criteria, fracture mechanics, compound cylinders, shrink fits, buckling of stepped columns, common shell types, and many other topics. The authors present significantly expanded and updated coverage of stress concentration factors and contact stress developments. Finally, they fully introduce computer-oriented approaches in a comprehensive new chapter on the finite element method.
Continuum Mechanics - D. S. Chandrasekharaiah 2014-05-19
A detailed and self-contained text written for beginners, Continuum Mechanics offers concise coverage of the basic concepts, general principles, and applications of continuum mechanics. Without sacrificing rigor, the clear and simple mathematical derivations are made accessible to a large number of students with little or no previous background in solid or fluid mechanics. With the inclusion of more than 250 fully worked-out examples and 500 worked exercises, this book is certain to become a standard introductory text for students as well as an indispensable reference for professionals. Key Features * Provides a clear and self-contained treatment of vectors, matrices, and tensors specifically tailored to the needs of continuum mechanics * Develops the concepts and principles common to all areas in solid and fluid mechanics with a common notation and terminology * Covers the fundamentals of elasticity theory and fluid mechanics
Introduction to Linear Elasticity - Phillip L.

Gould 2012-12-06
This applications-oriented introduction fills an important gap in the field of solid mechanics. Offering a thorough grounding in the tensor-based theory of elasticity for courses in mechanical, civil, materials or aeronautical engineering, it allows students to apply the basic notions of mechanics to such important topics as stress analysis. Further, they will also acquire the necessary background for more advanced work in elasticity, plasticity, shell theory, composite materials and finite element mechanics. This second edition features new chapters on the bending of thin plates, time-dependent effects, and strength and failure criteria.

An Introduction to Continuum Mechanics - Junuthula Narasimha Reddy 2013-07-29
This best-selling textbook presents the concepts of continuum mechanics, and the second edition includes additional explanations, examples and exercises.

Biomechanics - Cees Oomens 2009-02-02
This quantitative approach integrates the basic concepts of mechanics and computational modelling techniques for undergraduate biomedical engineering students.

Elasticity - Pei Chi Chou 2013-02-06
Exceptionally clear text treats elasticity from engineering and mathematical viewpoints. Comprehensive coverage of stress, strain, equilibrium, compatibility, Hooke's law, plane problems, torsion, energy, stress functions, more. 114 illustrations. 1967 edition.

Deterministic and Stochastic Optimal Control and Inverse Problems - Baasansuren Jadamba 2021-12-15
Inverse problems of identifying parameters and initial/boundary conditions in deterministic and stochastic partial differential equations constitute a vibrant and emerging research area that has found numerous applications. A related problem of paramount importance is the optimal control problem for stochastic differential equations. This edited volume comprises invited contributions from world-renowned researchers in the subject of control and inverse problems. There are several contributions on optimal control and inverse problems covering different aspects of the theory, numerical methods, and applications. Besides a unified presentation of the most recent and relevant developments, this volume also presents some survey articles to make the material self-contained. To maintain the highest level of scientific quality, all manuscripts have been thoroughly reviewed.

Computational Continuum Mechanics of Nanoscopic Structures - Esmaeal Ghavanloo 2019-02-19
This book offers a comprehensive treatment of nonlocal elasticity theory as applied to the prediction of the mechanical characteristics of various types of biological and non-biological nanoscopic structures with different morphologies and functional behaviour. It combines fundamental notions and advanced concepts, covering both the theory of nonlocal elasticity and the mechanics of nanoscopic structures and systems. By reporting on recent findings and discussing future challenges, the book seeks to foster the application of nonlocal elasticity based approaches to the emerging fields of nanoscience and nanotechnology. It is a self-contained guide, and covers all relevant background information, the requisite mathematical and computational techniques, theoretical assumptions, physical methods and possible limitations of the nonlocal approach, including some practical applications. Mainly written for researchers in the fields of physics, biophysics, mechanics, and nanoscience, as well as computational engineers, the book can also be used as a reference guide for senior undergraduate and graduate students, as well as practicing engineers working in a range of areas, such as computational condensed matter physics, computational materials science, computational nanoscience and nanotechnology, and nanomechanics.

A Student's Guide to Vectors and Tensors - Daniel A. Fleisch 2011-09-22
Vectors and tensors are among the most powerful problem-solving tools available, with applications ranging from mechanics and electromagnetics to general relativity. Understanding the nature and application of vectors and tensors is critically important to students of physics and engineering. Adopting the same approach used in his highly popular A Student's Guide to Maxwell's Equations, Fleisch explains vectors and tensors in plain language. Written for undergraduate and beginning

graduate students, the book provides a thorough grounding in vectors and vector calculus before transitioning through contra and covariant components to tensors and their applications. Matrices and their algebra are reviewed on the book's supporting website, which also features interactive solutions to every problem in the text where students can work through a series of hints or choose to see the entire solution at once. Audio podcasts give students the opportunity to hear important concepts in the book explained by the author.

Introduction to Continuum Mechanics - W Michael Lai 2009-09-03

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. New section at the end of Chapter 4 devoted to the integral formulation of the field equations 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

Continuum Mechanics and Plasticity - Han-Chin Wu 2004-12-20

Tremendous advances in computer technologies and methods have precipitated a great demand for refinements in the constitutive models of plasticity. Such refinements include the development of a model that would account for material anisotropy and produces results that compare well with experimental data. Key to developing such models-and to meeting many other challenges in the field- is a firm grasp of the principles of continuum mechanics and how they apply to the formulation of plasticity theory. Also critical is understanding the experimental aspects of plasticity and material anisotropy. Integrating the traditionally separate subjects of continuum mechanics and plasticity, this book builds understanding in all of those areas. Part I provides systematic, comprehensive coverage of continuum mechanics, from a review of Carteisian tensors to the relevant conservation laws and constitutive equation. Part II offers an exhaustive presentation of the continuum theory of plasticity. This includes a unique treatment of the experimental aspects of plasticity, covers anisotropic plasticity, and incorporates recent research results related to the endochronic theory of plasticity obtained by the author and his colleagues. By bringing all of these together in one book, Continuum Mechanics and Plasticity facilitates the learning of solid mechanics. Its readers will be well prepared for pursuing either research related to the mechanical behavior of engineering materials or developmental work in engineering analysis and design.

Continuum Mechanics for Engineers - G. Thomas Mase 2009-07-28

Continuum Mechanics for Engineers, Third Edition provides engineering students with a complete, concise, and accessible introduction to advanced engineering mechanics. The impetus

for this latest edition was the need to suitably combine the introduction of continuum mechanics, linear and nonlinear elasticity, and viscoelasticity for a graduate-leve

A First Course in Continuum Mechanics - Yuan-cheng Fung 1977

Introduction to Continuum Mechanics - W Michael Lai 2009-07-23

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. New section at the end of Chapter 4 devoted to the integral formulation of the field equations 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

Elasticity - Martin H. Sadd 2010-08-04

Although there are several books in print dealing with elasticity, many focus on specialized topics such as mathematical foundations, anisotropic materials, two-dimensional problems, thermoelasticity, non-linear theory, etc. As such they are not appropriate candidates for a general textbook. This book provides a concise and organized presentation and development of general theory of elasticity. This text is an excellent book teaching guide. Contains exercises for student engagement as well as the integration and use of MATLAB Software Provides development of common solution methodologies and a systematic review of analytical solutions useful in applications of

Fundamentals of Continuum Mechanics - John W. Rudnicki 2014-09-22

A concise introductory course text on continuum mechanics Fundamentals of Continuum Mechanics focuses on the fundamentals of the subject and provides the background for formulation of numerical methods for large deformations and a wide range of material behaviours. It aims to provide the foundations for further study, not just of these subjects, but also the formulations for much more complex material behaviour and their implementation computationally. This book is divided into 5 parts, covering mathematical preliminaries, stress, motion and deformation, balance of mass, momentum and energy, and ideal constitutive relations and is a suitable textbook for introductory graduate courses for students in mechanical and civil engineering, as well as those studying material science, geology and geophysics and biomechanics. A concise introductory course text on continuum mechanics Covers the fundamentals of continuum mechanics Uses modern tensor notation Contains problems and accompanied by a companion website hosting solutions Suitable as a textbook for introductory graduate courses for students in mechanical and civil engineering

Theoretical Elasticity - Albert Edward Green 1992-01-01

A valuable research tool in continuum mechanics

for more that 50 years, this highly regarded engineering manual focuses on three important aspects of elasticity theory: finite elastic deformations, complex variable methods for two-dimensional problems for both isotropic and aeolotropic bodies, and shell theory. Additional topics include three-dimensional problems for isotropic and transversely isotropic bodies.

Continuum Mechanics for Engineers - G. Thomas Mase 2020-05-01

A bestselling textbook in its first three editions, Continuum Mechanics for Engineers, Fourth Edition provides engineering students with a complete, concise, and accessible introduction to advanced engineering mechanics. It provides information that is useful in emerging engineering areas, such as micro-mechanics and biomechanics. Through a mastery of this volume's contents and additional rigorous finite element training, readers will develop the mechanics foundation necessary to skillfully use modern, advanced design tools. Features: Provides a basic, understandable approach to the concepts, mathematics, and engineering applications of continuum mechanics Updated throughout, and adds a new chapter on plasticity Features an expanded coverage of fluids Includes numerous all new end-of-chapter problems With an abundance of worked examples and chapter problems, it carefully explains necessary mathematics and presents numerous illustrations, giving students and practicing professionals an excellent self-study guide to enhance their skills.

Continuum Mechanics and Thermodynamics - Ellad B. Tadmor 2012

Treats subjects directly related to nonlinear materials modeling for graduate students and researchers in physics, materials science, chemistry and engineering.

Additive Friction Stir Deposition - Hang Z. Yu 2022-07-19

Additive Friction Stir Deposition is a comprehensive summary of the state-of-the-art understanding on this emerging solid-state additive manufacturing technology. Sections cover additive friction stir deposition, encompassing advances in processing science, metallurgical science and innovative applications. The book presents a clear description of underlying physical phenomena, shows how the process determines the printing quality, covers resultant microstructure and properties in the as-printed state, highlights its key capabilities and limitations, and explores niche applications in repair, cladding and multi-material 3D printing. Serving as an educational and research guide, this book aims to provide a holistic picture of additive friction stir deposition-based solid-state additive manufacturing as well as a thorough comparison to conventional beam-based metal additive manufacturing, such as powder bed fusion and directed energy deposition. Provides a clear process description of additive friction stir deposition and highlights key capabilities Summarizes the current research and application of additive friction stir deposition, including material flow, microstructure evolution, repair and dissimilar material cladding Discusses future applications and areas of research for this technology

Mathematical Foundations of Elasticity - Jerrold E. Marsden 2012-10-25

Graduate-level study approaches mathematical foundations of three-dimensional elasticity using modern differential geometry and functional analysis. It presents a classical subject in a modern setting, with examples of newer mathematical contributions. 1983 edition.

Fundamentals of Fracture Mechanics - Tribikram Kundu 2008-01-30

Almost all books available on fracture mechanics cover the majority of topics presented in this book, and often much, much more. While great as references, this makes teaching from them more difficult because the materials are not typically presented in the order that most professors cover them in their lectures and more than half the information p

Fox and McDonald's Introduction to Fluid Mechanics - Robert W. Fox 2020-06-30

Through ten editions, Fox and McDonald's Introduction to Fluid Mechanics has helped students understand the physical concepts, basic principles, and analysis methods of fluid mechanics. This market-leading textbook provides a balanced, systematic approach to mastering critical concepts with the proven Fox-McDonald solution methodology. In-depth yet accessible chapters present governing equations, clearly state assumptions, and relate

mathematical results to corresponding physical behavior. Emphasis is placed on the use of control volumes to support a practical, theoretically-inclusive problem-solving approach to the subject. Each comprehensive chapter includes numerous, easy-to-follow examples that illustrate good solution technique and explain challenging points. A broad range of carefully selected topics describe how to apply the governing equations to various problems, and explain physical concepts to enable students to model real-world fluid flow situations. Topics include flow measurement, dimensional analysis and similitude, flow in pipes, ducts, and open channels, fluid machinery, and more. To enhance student learning, the book incorporates numerous pedagogical features including chapter summaries and learning objectives, end-of-chapter problems, useful equations, and design and open-ended problems that encourage students to apply fluid mechanics principles to the design of devices and systems.

Nonlinear Solid Mechanics - Gerhard A. Holzapfel 2000-04-06

Providing a modern and comprehensive coverage of continuum mechanics, this volume includes information on "variational principles"--Significant, as this is the only method by which such material is actually utilized in engineering practice.

Mathematical Modelling and Biomechanics of the Brain - Corina Drapaca 2019-09-06

This monograph aims to provide a rigorous yet accessible presentation of some fundamental concepts used in modeling brain mechanics and give a glimpse of the insights and advances that have arisen as a result of the nascent interaction of the mathematical and neurosurgical sciences. It begins with some historical perspective and a brief synopsis of the biomedical/biological manifestations of the clinical conditions/diseases considered. Each chapter proceeds with a discussion of the various mathematical models of the problems considered, starting with the simplest models and proceeding to more complex models where necessary. A detailed list of relevant references is provided at the end of each chapter. With the beginning research student in mind, the chapters have been crafted to be as self-contained as possible while addressing different clinical conditions and diseases. The book is intended as a brief introduction to both theoreticians and experimentalists interested in brain mechanics, with directions and guidance for further reading, for those who wish to pursue particular topics in greater depth. It can also be used as a complementary textbook in a graduate level course for neuroscientists and neuroengineers.

Mathematics Applied to Continuum Mechanics - Lee A. Segel 2007-07-12

This classic work gives an excellent overview of the subject, with an emphasis on clarity, explanation, and motivation. Extensive exercises and a valuable section containing hints and answers make this an excellent text for both classroom use and independent study.

Phase-field Modeling of Multi-domain Evolution in Ferromagnetic Shape Memory Alloys and of Polycrystalline Thin Film Growth - Christian Mennerich 2014-05-13

The phase-field method is a powerful tool in computer-aided materials science as it allows for the analysis of the time-spatial evolution of microstructures on the mesoscale. A multi-phase-field model is adopted to run numerical simulations in two different areas of scientific interest: Polycrystalline thin films growth and the ferromagnetic shape memory effect. FFT-techniques, norm conservative integration and RVE-methods are necessary to make the coupled problems numerically feasible.

Mathematical modelling of flow through thin curved pipes with application to hemodynamics - Arpan Ghosh 2019-04-17

The problem of mathematical modelling of incompressible flows with low velocities through narrow curvilinear pipes is addressed in this thesis. The main motivation for this modelling task is to eventually model the human circulatory system in a simple way that can facilitate the medical practitioners to efficiently diagnose any abnormality in the system. The thesis comprises of four articles. In the first article, a two-dimensional model describing the elastic behaviour of the wall of a thin, curved, exible pipe is presented. The wall is assumed to have a laminate structure consisting of several anisotropic layers of varying thickness. The width of the channel is allowed to vary along the pipe. The two-dimensional model takes the interactions of the wall with any surrounding

material and the fluid flow into account and is obtained through a dimension reduction procedure. Examples of canonical shapes of pipes and their walls are provided with explicit systems of differential equations at the end. In the second article, a one-dimensional model describing the blood flow through a moderately curved, elastic blood vessel is presented. The two-dimensional model presented in the first paper is used to model the vessel wall while linearized Navier-Stokes equations are used to model the flow through the channel. Surrounding muscle tissues and presence of external forces other than gravity are taken into account. The model is again obtained via a dimension reduction procedure based on the assumption of thinness of the vessel relative to its length. Results of numerical simulations are presented to highlight the influence of different factors on the blood flow. The one-dimensional model described in the second paper is used to derive a simplified one-dimensional model of a false aneurysm which forms the subject of the third article. A false aneurysm is an accumulation of blood outside a blood vessel but confined by the surrounding muscle tissue. Numerical simulations are presented which demonstrate different characteristics associated with a false aneurysm. In the final article, a modified Reynolds equation, along with its derivation from Stokes equations through asymptotic methods, is presented. The equation governs the steady flow of a fluid with low Reynolds number through a narrow, curvilinear tube. The channel considered may have large curvature and torsion. Approximations of the velocity and the pressure of the fluid inside the channel are constructed. These approximations satisfy a modified Poiseuille equation. A justification for the approximations is provided along with a comparison with a simpler case.

Nonlinear Continuum Mechanics for Finite Element Analysis - Javier Bonet 2008-03-13

Designing engineering components that make optimal use of materials requires consideration of the nonlinear characteristics associated with both manufacturing and working environments. The modeling of these characteristics can only be done through numerical formulation and simulation, and this requires an understanding of both the theoretical background and associated computer solution techniques. By presenting both nonlinear continuum analysis and associated finite element techniques under one roof, Bonet and Wood provide, in this edition of this successful text, a complete, clear, and unified treatment of these important subjects. New chapters dealing with hyperelastic plastic behavior are included, and the authors have thoroughly updated the FLagSHyP program, freely accessible at www.flagshyp.com. Worked examples and exercises complete each chapter, making the text an essential resource for postgraduates studying nonlinear continuum mechanics. It is also ideal for those in industry requiring an appreciation of the way in which their computer simulation programs work.

Introduction to Continuum Mechanics - David Rubin 2012-12-02

Continuum mechanics studies the response of materials to different loading conditions. The concept of tensors is introduced through the idea of linear transformation in a self-contained chapter, and the interrelation of direct notation, indicial notation and matrix operations is clearly presented. A wide range of idealized materials are considered through simple static and dynamic problems, and the book contains an abundance of illustrative examples and problems, many with solutions. Through the addition of more advanced material (solution of classical elasticity problems, constitutive equations for viscoelastic fluids, and finite deformation theory), this popular introduction to modern continuum mechanics has been fully revised to serve a dual purpose: for introductory courses in undergraduate engineering curricula, and for beginning graduate courses.

Structural Geology: A Quantitative Introduction - David D. Pollard 2020-07-23

Tackling structural geology problems today requires a quantitative understanding of the underlying physical principles, and the ability to apply mathematical models to deformation processes within the Earth. Accessible yet rigorous, this unique textbook demonstrates how to approach structural geology quantitatively using calculus and mechanics, and prepares students to interface with professional geophysicists and engineers who appreciate and utilize the same tools and computational methods to solve multidisciplinary problems.

Clearly explained methods are used throughout the book to quantify field data, set up mathematical models for the formation of structures, and compare model results to field observations. An extensive online package of coordinated laboratory exercises enables students to consolidate their learning and put it into practice by analyzing structural data and building insightful models. Designed for single-semester undergraduate courses, this pioneering text prepares students for graduates studies and careers as professional geoscientists.

Continuum Mechanics - A. J. M. Spencer 2012-06-08

Undergraduate text offers an analysis of deformation and stress, covers laws of conservation of mass, momentum, and energy, and surveys the formulation of mechanical constitutive equations. 1992 edition.

Schaum's Outline of Continuum Mechanics - George Mase 1970

For comprehensive—and comprehensible—coverage of both theory and real-world applications, you can’t find a better study guide than Schaum’s Outline of Continuum Mechanics. It gives you everything you need to get ready for tests and earn better grades! You get plenty of worked problems—solved for you step by step—along with hundreds of practice problems. From the mathematical foundations to fluid mechanics and viscoelasticity, this guide covers all the fundamentals—plus it shows you how theory is applied. This is the study guide to choose if you want to ace continuum mechanics!

Biomechanics - Y. C. Fung 2013-06-29

The motivation for writing aseries ofbooks on biomechanics is to bring this rapidly developing subject to students of bioengineering, physiology, and mechanics. In the last decade biomechanics has become a recognized disci pline offered in virtually all universities. Yet there is no adequate textbook for instruction; neither is there a treatise with sufficiently broad coverage. A few books bearing the title of biomechanics are too elementary, others are too specialized. I have long feIt a need for a set of books that will inform students of the physiological and medical applications of biomechanics, and at the same time develop their training in mechanics. We cannot assume that all students come to biomechanics already fully trained in fluid and solid mechanics; their knowledge in these subjects has to be developed as the course proceeds. The scheme adopted in the present series is as follows. First, some basic training in mechanics, to a level about equivalent to the first seven chapters of the author's A First Course in Continuum Mechanics (Prentice-Hall,lnc. 1977), is assumed. We then present some essential parts of biomechanics from the point of view of bioengineering, physiology, and medical applications. In the meantime, mechanics is developed through a sequence of problems and examples. The main text reads like physiology, while the exercises are planned like a mechanics textbook. The instructor may fil1 a dual role: teaching an essential branch of life science, and gradually developing the student's knowledge in mechanics.

Elastic Wave Propagation and Generation in Seismology - Jose Pujol 2003-05-01

Bridging the gap between introductory textbooks and advanced monographs, this book provides the necessary mathematical tools to tackle seismological problems and demonstrates how to apply them. Including student exercises, for which solutions are available on a dedicated website, it appeals to advanced undergraduate and graduate students. It is also a useful reference volume for researchers wishing to "brush up" on fundamentals before they study more advanced topics in seismology.

Continuum Mechanics and Linear Elasticity - Ciprian D. Coman 2019-11-02

This is an intermediate book for beginning postgraduate students and junior researchers, and offers up-to-date content on both continuum mechanics and elasticity. The material is self-contained and should provide readers sufficient working knowledge in both areas. Though the focus is primarily on vector and tensor calculus (the so-called coordinate-free approach), the more traditional index notation is used whenever it is deemed more sensible. With the increasing demand for continuum modeling in such diverse areas as mathematical biology and geology, it is imperative to have various approaches to continuum mechanics and elasticity. This book presents these subjects from an applied mathematics perspective. In particular, it extensively uses linear algebra and vector

calculus to develop the fundamentals of both subjects in a way that requires minimal use of coordinates (so that beginning graduate students and junior researchers come to appreciate the power of the tensor notation).

A First Course in Continuum Mechanics - Oscar Gonzalez 2008-01-17

The modeling and simulation of fluids, solids and other materials with significant coupling and thermal effects is becoming an increasingly important area of study in applied mathematics and engineering. Necessary for such studies is a fundamental understanding of the basic principles of continuum mechanics and thermodynamics. This book is a clear introduction to these principles. It is designed for a one- or two-quarter course for advanced undergraduate and beginning graduate students in the mathematical and engineering sciences, and is based on over nine years of teaching experience. It is also sufficiently self-contained for use outside a classroom environment. Prerequisites include a basic knowledge of linear algebra, multivariable calculus, differential equations and physics. The authors begin by explaining tensor algebra and calculus in three-dimensional Euclidean space. Using both index and coordinate-free notation, they introduce the basic axioms of continuum mechanics pertaining to mass, force, motion, temperature, energy and entropy, and the concepts of frame-indifference and material constraints. They devote four chapters to different theories of fluids and solids, and, unusually at this level, they consider both isothermal and thermal theories in detail. The book contains a wealth of exercises that support the theory and illustrate various applications. Full solutions to odd-numbered exercises are given at the end of each chapter and a complete solutions manual for all exercises is available to instructors upon request. Each chapter also contains a bibliography with references covering different presentations, further applications and numerical aspects of the theory. Book jacket.

Introduction to the Mechanics of a Continuous Medium - Lawrence E. Malvern 1969

Tensor Algebra and Tensor Analysis for Engineers - Mikhail Itskov 2007-05-04

There is a large gap between engineering courses in tensor algebra on one hand, and the treatment of linear transformations within classical linear algebra on the other. This book addresses primarily engineering students with some initial knowledge of matrix algebra. Thereby, mathematical formalism is applied as far as it is absolutely necessary. Numerous exercises provided in the book are accompanied by solutions enabling autonomous study. The last chapters deal with modern developments in the theory of isotropic and anisotropic tensor functions and their applications to continuum mechanics and might therefore be of high interest for PhD-students and scientists working in this area.