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THORNTON YARELI

Continuum Mechanics Modeling of Material Behavior Springer
This book presents an introduction into the entire science of Continuum Mechanics in three parts. The presentation is modern and comprehensive. Its introduction into tensors is very gentle. The book contains many examples and exercises, and is intended for scientists, practitioners and students of mechanics.
Solid Mechanics Cambridge University Press
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 Alpha Science Int'l Ltd.
Continuum Mechanics Modeling of Material Behavior offers a uniquely comprehensive introduction to topics like RVE theory, fabric tensor models, micropolar elasticity, elasticity with voids, nonlocal higher gradient elasticity and damage mechanics. Contemporary continuum mechanics research has been moving into areas of complex material microstructural behavior. Graduate students who are expected to do this type of research need a fundamental background beyond classical continuum theories. The book begins with several chapters that carefully and rigorously present mathematical preliminaries; kinematics of motion and deformation; force and stress measures; and mass, momentum and energy balance principles. The book then moves beyond other books by dedicating the last chapter to constitutive equation development, exploring a wide collection of constitutive relations and developing the corresponding material model formulations. Such material behavior models include classical linear theories of elasticity, fluid mechanics, viscoelasticity and plasticity, as well as linear and nonlinear theories of solids and fluids, including finite elasticity, nonlinear/non-Newtonian viscous fluids, and nonlinear viscoelastic materials. Finally, several relatively new continuum theories based on incorporation of material microstructure are presented including: fabric tensor theories, micropolar elasticity, elasticity with voids, nonlocal higher gradient elasticity and damage mechanics. Offers a thorough, concise and organized presentation of continuum mechanics formulation Covers numerous applications in areas of contemporary continuum mechanics modeling, including micromechanical and multi-scale problems Integration and use of MATLAB software gives students more tools to solve, evaluate and plot problems under study Features extensive use of exercises, providing more material for student engagement and instructor presentation
Continuum Mechanics and Theory of Materials Springer
This textbook explores the theory of Cosserat continuum mechanics, and covers fundamental tools, general laws and major models, as well as applications to the mechanics of granular media. While classical continuum mechanics is based on the axiom that the stress tensor is symmetric, theories such as that expressed in the seminal work of the brothers Eugène and François Cosserat are characterized by a non-symmetric stress tensor. The use of von Mises motor mechanics is introduced, for the compact mathematical description of the mechanics and statics of Cosserat continua, as the Cosserat continuum is a manifold of oriented “rigid particles” with 3 dofs of displacement and 3 dofs of rotation, rather than a manifold of points with 3 dofs of displacement. Here, the analysis is restricted to infinitesimal particle displacements and rotations. This book is intended as a valuable supplement to standard Continuum Mechanics courses, and graduate students as well as researchers in mechanics and applied mathematics will benefit from its self-contained text, which is enriched by numerous examples and exercises.
Elements of Continuum Mechanics and Conservation Laws Springer
This third edition includes the corrections made by the late C. Truesdell in his personal copy. It is annotated by S. Antman who describes the monograph`s genesis and the impact it has made on the modern development of mechanics. Originally published as Volume III/3 of the famous Encyclopedia of Physics in 1965, this book describes and summarizes "everything that was both known and worth knowing in the field at the time." It also has greatly contributed to the unification and standardization of the concepts, terms and notations in the field.
Foundations and Applications of Mechanics: Continuum mechanics Springer Science & Business Media
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.
Theory of Elasticity Springer Science & Business Media
The only modern, up-to-date introduction to plasticity Despite phenomenal progress in plasticity research over the past fifty years, introductory books on plasticity have changed very little. To meet the need for an up-to-date introduction to the field, Akhtar S. Khan and Sujian Huang have written Continuum Theory of Plasticity--a truly modern text which offers a continuum mechanics approach as well as a lucid presentation of the essential classical contributions. The early chapters give the reader a review of elementary concepts of plasticity, the necessary background material on continuum mechanics, and a discussion of the classical theory of plasticity. Recent developments in the field are then explored in sections on the Mroz Multisurface model, the Dafalias and Popov Two Surface model, the non-linear kinematic hardening model, the endochronic theory of plasticity, and numerous topics in finite deformation plasticity theory and strain space formulation for plastic deformation. Final chapters introduce the fundamentals of the micromechanics of plastic deformation and the analytical coupling between deformation of individual crystals and macroscopic material response of the polycrystal aggregate. For graduate students and researchers in engineering mechanics, mechanical, civil, and aerospace engineering, Continuum Theory of Plasticity offers a modern, comprehensive introduction to the entire subject of plasticity.
The Non-Linear Field Theories of Mechanics / Die Nicht-Linearen Feldtheorien der Mechanik Springer Science &

Business Media
After providing the necessary mathematical background needed, the book discusses kinematics, governing equations and constitutive relations for simple materials. Major emphasis is laid on discussing relatively recent ideas such as material frame-indifference, the implications of the second law of thermodynamics, material symmetry etc. The text shows how, under suitable assumptions, the classical theories of fluid mechanics, solid mechanics (including the linear theory of elasticity), and rigid-body dynamics follow form the general continuum equations. While maintaining mathematical rigor the book maintains the link between mathematics and physical reality by presenting examples. This book intended as an advanced undergraduate (or a graduate level) textbook in continuum mechanics and its applications.
Trends in Continuum Mechanics of Porous Media Springer
This text gives a clear presentation of continuum mechanics that can be applied to not only classical solid and fluid mechanics, but shows the way to application to newer materials that are increasingly finding technical applications. The book will thus be useful as text for graduate students, and also researchers on mechanics of continuous materials of different varieties.
Statistical Continuum Mechanics Courier Corporation
The new edition includes additional analytical methods in the classical theory of viscoelasticity. This leads to a new theory of finite linear viscoelasticity of incompressible isotropic materials. Anisotropic viscoplasticity is completely reformulated and extended to a general constitutive theory that covers crystal plasticity as a special case.
An Introduction to Continuum Mechanics Springer Science & Business Media
This dictionary offers clear and reliable explanations of over 100 keywords covering the entire field of non-classical continuum mechanics and generalized mechanics, including the theory of elasticity, heat conduction, thermodynamic and electromagnetic continua, as well as applied mathematics. Every entry includes the historical background and the underlying theory, basic equations and typical applications. The reference list for each entry provides a link to the original articles and the most important in-depth theoretical works. Last but not least, ever y entry is followed by a cross-reference to other related subject entries in the dictionary.
Mathematical Methods in Continuum Mechanics of Solids Elsevier
This volume presents a collection of contributions on advanced approaches of continuum mechanics, which were written to celebrate the 60th birthday of Prof. Holm Altenbach. The contributions are on topics related to the theoretical foundations for the analysis of rods, shells and three-dimensional solids, formulation of constitutive models for advanced materials, as well as development of new approaches to the modeling of damage and fractures.
Mathematical Theory of Continuum Mechanics Alpha Science International Limited
Over the last decade and particularly in recent years, the macroscopic porous media theory has made decisive progress concerning the fundamentals of the theory and the development of mathematical models in various fields of engineering and biomechanics. This progress has attracted some attention, and therefore conferences devoted almost exclusively to the macrosopic porous media theory have been organized in order to collect all findings, to present new results, and to discuss new trends. Many important contributions have also been published in national and international journals, which have brought the porous media theory, in some parts, to a close. Therefore, the time seems to be ripe to review the state of the art and to show new trends in the continuum mechanical treatment of saturated and unsaturated capillary and non-capillary porous solids. This book addresses postgraduate students and scientists working in engineering, physics, and mathematics. It provides an outline of modern theory of porous media and shows some trends in theory and in applications.
Nonlinear Continuum Mechanics and Large Inelastic Deformations McGraw Hill Professional
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
Tensor Analysis and Continuum Mechanics Springer Science & Business Media
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
Theory and Practice of Solid Mechanics Academic Press
Elements of Continuum Mechanics and Conservation Laws presents a systematization of different models in mathematical physics, a study of the structure of conservation laws, thermodynamical identities, and connection with criteria for well-posedness of the corresponding mathematical problems. The theory presented in this book stems from research carried out by the authors concerning the formulations of differential equations describing explosive deformations of metals. In such processes, elasticity equations are used in some zones, whereas hydrodynamics equations are stated in other zones. Plastic deformations appear in transition zones, which leads to residual stresses. The suggested model contains some relaxation terms which simulate these plastic deformations. Certain laws of thermodynamics are used in order to describe and study differential equations simulating the physical processes. This leads to the special formulation of differential equations using generalized thermodynamical potentials.
Tensor Analysis and Continuum Mechanics CRC Press
Most books on continuum mechanics focus on elasticity and fluid mechanics. But whether student or practicing professional, modern engineers need a more thorough treatment to understand the behavior of the complex materials and systems in use today. Continuum Mechanics: Elasticity, Plasticity, Viscoelasticity offers a complete tour of the subject that includes not only elasticity and fluid mechanics but also covers plasticity, viscoelasticity, and the continuum model for fatigue and fracture mechanics. In addition to a broader scope, this book also supplies a review of the necessary mathematical tools and results for a self-contained treatment. The author provides finite element formulations of the equations encountered throughout the chapters and uses an approach with just the right amount of mathematical rigor without being too theoretical for practical use. Working systematically from the continuum model for the thermomechanics of materials, coverage moves through linear and nonlinear elasticity using both tensor and matrix notation, plasticity, viscoelasticity, and concludes by introducing the fundamentals of fracture mechanics and fatigue of metals. Requisite mathematical tools appear in the final chapter for easy reference. Continuum Mechanics: Elasticity, Plasticity, Viscoelasticity builds a strong understanding of the principles, equations, and finite element formulations needed to solve real engineering problems.
Continuum Mechanics and Plasticity Morgan & Claypool
This book offers a comprehensive and timely report of size-dependent continuum mechanics approaches. Written by scientists with worldwide reputation and established expertise, it covers the most recent findings, advanced theoretical developments and computational techniques, as well as a range of applications, in the field of nonlocal continuum mechanics. Chapters are concerned with lattice-based nonlocal models, Eringen’s nonlocal models, gradient theories of elasticity, strain- and stress-driven nonlocal models, and peridynamic theory, among other topics. This book provides researchers and practitioners with extensive and specialized information on cutting-edge theories and methods, innovative solutions to current problems and a timely insight into the behavior of some advanced materials and structures. It also offers a useful reference guide to senior undergraduate and graduate students in mechanical engineering, materials science, and applied physics.
Schaum's Outline of Continuum Mechanics Springer Science & Business Media
This book is designed for students in engineering, physics and mathematics. The material can be taught from the beginning of the third academic year. It could also be used for self study, given its pedagogical structure and the numerous solved problems which prepare for modem physics and technology. One of the original aspects of this work is the development together of the basic theory of tensors and the foundations of continuum mechanics. Why two books in one? Firstly, Tensor Analysis provides a thorough introduction of intrinsic mathematical entities, called tensors, which is essential for continuum mechanics. This way of proceeding greatly unifies the various subjects. Only some basic knowledge of linear algebra is necessary to start out on the topic of tensors. The essence of the mathematical foundations is introduced in a practical way. Tensor developments are often too abstract, since they are either aimed at algebraists only, or too quickly applied to physicists and engineers. Here a good balance has been found which allows these extremes to be brought closer together. Though the exposition of tensor theory forms a subject in itself, it is viewed not only as an autonomous mathematical discipline, but as a preparation for theories of physics and engineering. More specifically, because this part of the work deals with tensors in general coordinates and not solely in Cartesian coordinates, it will greatly help with many different disciplines such as differential geometry, analytical mechanics, continuum mechanics, special relativity, general relativity, cosmology, electromagnetism, quantum mechanics, etc ..
Continuum Mechanics Springer Science & Business Media
Treats subjects directly related to nonlinear materials modeling for graduate students and researchers in physics, materials science, chemistry and engineering.