Engineering Mechanics Of Solids

Engineering Mechanics of SolidsAN INTRODUCTION TO MECHANICS OF SOLIDSExperimental Mechanics of Solids and StructuresMechanics Of Elastic SolidsMechanics of SolidsMechanics of Materials: SI VersionMechanics of Solid MaterialsIntroduction to Solid MechanicsTheory Of Plates & Shells 2EMechanics of Deformable SolidsMechanics Of Solids And Structures (2nd Edition)Advanced Mechanics of SolidsApplied Mechanics of SolidsMECHANICS OF SOLIDSThe Mechanics of Solids and Structures - Hierarchical Modeling and the Finite Element SolutionThe Elements of MechanicsAdvanced Mechanics Of SolidsMechanics of SolidsIntermediate Solid MechanicsEngineering Mechanics of SolidsEngineering Mechanics of Deformable SolidsMechanics of Solids and Structures, Second EditionNonlinear Continuum Mechanics of SolidsSoft SolidsMethods of Fundamental Solutions in Solid MechanicsContinuum Mechanics of SolidsMechanics of SolidsMechanics of SolidsMechanics of Solids and FluidsElementary Mechanics of SolidsExperimental Mechanics of SolidsNonlinear Solid MechanicsMechanics of Solids and MaterialsContinuum Mechanics of SolidsEngineering MechanicsMechanics of Solids and ShellsIntroduction to Mechanics of SolidsSolid MechanicsMechanics of Solid PolymersEngineering Solid Mechanics

Engineering Mechanics of Solids

From the characterization of materials to accelerated life testing, experimentation with solids and structures is present in all stages of the design of mechanical devices. Sometimes only an experimental model can bring the necessary elements for understanding, the physics under study just being too complex for an efficient numerical model. This book presents the classical tools in the experimental approach to mechanical engineering, as well as the methods that have revolutionized the field over the past 20 years: photomechanics, signal processing, statistical data analysis, design of experiments, uncertainty analysis, etc. Experimental Mechanics of Solids and Structures also replaces mechanical testing in a larger context: firstly, that of the experimental model, with its own hypotheses; then that of the knowledge acquisition process, which is structured and robust; finally, that of a reliable analysis of the results obtained, in a context where uncertainty could be important.

AN INTRODUCTION TO MECHANICS OF SOLIDS

An explanation of the basic theory of engineering mechanics for mechanical, civil, and materials engineers. The presentation is concise and geared to more mathematically-oriented students and those looking to quickly refresh their understanding of engineering mechanics.

Experimental Mechanics of Solids and Structures

This is a textbook for courses in civil and mechanical engineering that are commonly called Strength of Materials or Mechanics of Materials. The intent of this book is to provide a background in the mechanics of solids for students of mechanical engineering, while limiting the information on why materials behave as they do. It is assumed that the students have already had courses covering materials science and basic statics. Much of the material is drawn from another book by the author, Mechanical Behavior of Materials. To make the text suitable for mechanical engineers, the chapters on slip, dislocations, twinning, residual stresses, and hardening mechanisms have been eliminated and the treatment of ductility viscoelasticity, creep, ceramics, and polymers has been simplified.

Mechanics Of Elastic Solids

Very few polymer mechanics problems are solved with only pen and paper today, and virtually all academic research and industrial work relies heavily on finite element simulations and specialized computer software. Introducing and demonstrating the utility of computational tools and simulations, Mechanics of Solid Polymers provides a modern view of how solid polymers behave, how they can be experimentally characterized, and how to predict their behavior in different load environments. Reflecting the significant progress made in the understanding of polymer behaviour over the last two decades, this book will discuss recent developments and compare them to classical theories. The book shows how best to make use of commercially available finite element software to solve polymer mechanics problems, introducing readers to the current state of the art in predicting failure using a combination of experiment and computational techniques. Case studies and example Matlab code are also included. As industry and academia are increasingly reliant on advanced computational mechanics software to implement sophisticated constitutive models – and authoritative information is hard to find in one place - this book provides engineers with what they need to know to make best use of the technology available. Helps professionals deploy the latest experimental polymer testing methods to assess suitability for applications Discusses material models for different polymer types Shows how to best make use of available finite element software to model polymer behaviour, and includes case studies and example code to help engineers and researchers apply it to their work

Mechanics of Solids

This text is based on the understanding and application of three fundamental physical considerations which govern the mechanics of solids in equilibrium. All the discussion and theoretical development is explicitly related to these three basic considerations. This approach brings in unity to an elementary presentation of the subject. Considerable emphasis has been

put on the process of constructing idealized models to represent actual physical situations. Feature: • Completely in SI Units • The book begins with all crude approximations and goes on to remove them oneby- one leading to a more realistic picture of the concepts o Strong pedagogical features Includes: o 626 Figures o 456 Problems feature

Mechanics of Materials: SI Version

Continuum Mechanics of Solids is an introductory text for graduate students in the many branches of engineering, covering the basics of kinematics, equilibrium, and material response. As an introductory book, most of the emphasis is upon the kinematically linear theories of elasticity, plasticity, and viscoelasticity, with two additional chapters devoted to topics in finite elasticity. Further chapters cover topics in fracture and fatigue and coupled field problems, such as thermoelasticity, chemoelasticity, poroelasticity, and piezoelectricity. There is ample material for a two semester course, or by selecting only topics of interest for a one-semester offering. The text includes numerous examples to aid the student. A companion text with over 180 fully worked problems is also available.

Mechanics of Solid Materials

An introduction to the fundamental concepts of solid materials and their properties The primary recommended text of the Council of Engineering Institutions for university undergraduates studying the mechanics of solids New chapters covering revisionary mathematics, geometrical properties of symmetrical sections, bending stresses in beams, composites and the finite element method Free electronic resources and web downloads support the material contained within this book Mechanics of Solids provides an introduction to the behaviour of solid materials and their properties, focusing upon the fundamental concepts and principles of statics and stress analysis. Essential reading for first year undergraduates, the mathematics in this book has been kept as straightforward as possible and worked examples are used to reinforce key concepts. Practical stress and strain scenarios are also covered including stress and torsion, elastic failure, buckling, bending, as well as examples of solids such as thin-walled structures, beams, struts and composites. This new edition includes new chapters on revisionary mathematics, geometrical properties of symmetrical sections, bending stresses in beams, composites, the finite element method, and Ross’s computer programs for smartphones, tablets and computers.

Introduction to Solid Mechanics

This textbook is for advanced students who already are familiar with the elementary concepts of statics and the strength of materials. The principles of linear continuum mechanics and linear elastic material behavior are presented. They build the foundation for the later treatment of structures such as beams, bars, plates and shells. Particular attention is paid to the

respective thin-walled cases. The text also contains some chapters on the more and more important topic of dynamics of structures. Moreover, it provides the fundamental principles underlying modern computer methods. The book is structured such that in each chapter the theoretical considerations are accompanied by several illustrative examples demonstrating the application of these results. At the end of each chapter, additional problems are included. The solutions to these problems are given in the last chapter.

Theory Of Plates & Shells 2E

The fifteen chapters of this book are arranged in a logical progression. The text begins with the more fundamental material on stress and strain transformations with elasticity theory for plane and axially symmetric bodies, followed by a full treatment of the theories of bending and torsion. Coverage of moment distribution, shear flow, struts and energy methods precede a chapter on finite elements. Thereafter, the book presents yield and strength criteria, plasticity, collapse, creep, visco-elasticity, fatigue and fracture mechanics. Appended is material on the properties of areas, matrices and stress concentrations. Each topic is illustrated by worked examples and supported by numerous exercises drawn from the author's teaching experience and professional institution examinations (CEI).This edition includes new material and an extended exercise section for each of the fifteen chapters, as well as three appendices. The broad text ensures its suitability for undergraduate and postgraduate courses in which the mechanics of solids and structures form a part including: mechanical, aeronautical, civil, design and materials engineering.

Mechanics of Deformable Solids

Nonlinear Solid Mechanics a Continuum Approach for Engineering Gerhard A. Holzapfel Graz University of Technology, Austria With a modern, comprehensive approach directed towards computational mechanics, this book covers a unique combination of subjects at present unavailable in any other text. It includes vital information on 'variational principles' constituting the cornerstone of the finite element method. In fact this is the only method by which Nonlinear Solid Mechanics is utilized in engineering practice. The book opens with a fundamental chapter on vectors and tensors. The following chapters are based on nonlinear continuum mechanics - an inevitable prerequisite for computational mechanicians. In addition, continuum field theory (applied to a representative sample of hyperelastic materials currently used in nonlinear computations such as incompressible and compressible materials) is presented, as are transversely isotropic materials, composite materials, viscoelastic materials and hyperelastic materials with isotropic damage. Another central chapter is devoted to the thermodynamics of materials, covering both finite thermoelasticity and finite thermoviscoelasticity. Also included are: * an up-to-date list of almost 300 references and a comprehensive index * useful examples and exercises for the student * selected topics of statistical and continuum thermodynamics. Furthermore, the

principle of virtual work (in both the material and spatial descriptions) is compared with two and three-field variational principles particularly designed to capture kinematic constraints such as incompressibility. All of the features combined result in an essential text for final year undergraduates, postgraduates and researchers in mechanical, civil and aerospace engineering and applied maths and physics.

Mechanics Of Solids And Structures (2nd Edition)

Advanced Mechanics of Solids

Modern computer simulations make stress analysis easy. As they continue to replace classical mathematical methods of analysis, these software programs require users to have a solid understanding of the fundamental principles on which they are based.Develop Intuitive Ability to Identify and Avoid Physically Meaningless PredictionsApplied Mechanics o

Applied Mechanics of Solids

This book examines the issues across the breadth of elasticity theory. Firstly, the underpinning mathematics of vectors and matrices is covered. Thereafter, the equivalence between the inidicial, symbolic and matrix notations used for tensors is illustrated in the preparation for specific types of material behaviour to be expressed, usually as a response function from which a constitutive stress-strain relation follow.Mechanics of Elastic Solids shows that the elastic response of solid materials has many forms. Metals and their alloys confirm dutifully to Hooke's law. Non-metals do not when the law connecting stress to strain is expressed in polynomial, exponential and various empirical, material specific forms. Hyper- and hypo- elasticity theories differ in that the former is restricted to its thermodynamic basis while the latter pervades many an observed response with its release from thermal restriction, but only at the risk of contravening the laws of thermodynamics.This unique compendium is suitable for a degree or diploma course in engineering and applied mathematics, as well as postgraduate and professional researchers.

MECHANICS OF SOLIDS

The word "elements" in the title of this book does not convey the implica tion that its contents are "elementary" in the sense of "easy": it mainly means that no prerequisites are required, with the exception of some basic background in classical physics and calculus. It also signifies "devoted to the foundations". In fact, the arguments chosen are all very classical, and the formal or technical developments of this century are absent, as well as a detailed treatment of such

problems as the theory of the planetary motions and other very concrete mechanical problems. This second meaning, however, is the result of the necessity of finishing this work in a reasonable amount of time rather than an a priori choice. Therefore a detailed review of the "few" results of ergodic theory, of the "many" results of statistical mechanics, of the classical theory of fields (elasticity and waves), and of quantum mechanics are also totally absent; they could constitute the subject of two additional volumes on mechanics. This book grew out of several courses on meccanica razionaie, i.e., essentially, theoretical mechanics, which I gave at the University of Rome during the years 1975-1978.

The Mechanics of Solids and Structures - Hierarchical Modeling and the Finite Element Solution

Designed as a text for both the undergraduate and postgraduate students of civil, mechanical, aerospace, and marine engineering, this book provides an indepth analysis of the fundamental principles of mechanics of deformable solids based on the phenomenological approach. The book starts with linear and angular momentum principles for a body. It introduces the concepts of stress, strain and the constitutive relations using tensors. Then it goes on to give a description of the laws of thermodynamics as a restriction on constitutive relations and formulates the boundary value problem in elasticity. Besides, the text treats bar under axial, bending and torsional deformation as well as plane stress and plane strain idealizations. The book concludes with a discussion on variational mechanics and the theory of plasticity. DISTINGUISHING FEATURES l Elaborate treatment of constitutive relations for linear elasticity. l Consistent formulation of strength of materials approach and three-dimensional elasticity for bar under axial, bending and torsional deformation. l Presentation of failure criteria and plasticity theory taking the modern developments into account. □ Large number of worked-out examples throughout the text and exercises at the end of each chapter.

The Elements of Mechanics

Elementary Mechanics of Solids presents the three fundamental principles, namely, equilibrium of forces, stress-strain relationship, and geometry and compatibility of deformations. This book discusses the concept of simplifying assumptions about behavior to obtain the simpler engineering solutions. Organized into seven chapters, this book begins with an overview of the theory of elasticity. This text then presents a detailed discussion of biaxial stress and strain systems as well as the generalized stress-strain relationships. Other chapters consider the determination of deflections of straight and curved beams due to shearing and bending action. This book discusses as well the elastic torsion of various thin-walled closed and open sections as well as the shaft of solid circular cross section. The final chapter discusses some cases in which the combined effects of torsion and bending occur. This book is a valuable resource for students who wish to obtain a university degree in engineering, diploma of technology, or higher national certificate.

Advanced Mechanics Of Solids

Mechanics of Solids emphasizes the development of analysis techniques from basic principles for a broad range of practical problems, including simple structures, pressure vessels, beams and shafts. Increased use of personal computers has revolutionized the way in which engineering problems are being solved and this is reflected in the way subjects such as mechanics of solids are taught. A unique feature of this book is the integration of numerical and computer techniques and programs for carrying out analyses, facilitating design, and solving the problems found at the end of each chapter. However, the underlying theory and traditional manual solution methods cannot be ignored and are presented prior to the introduction of computer techniques All programs featured in the book are in FORTRAN 77-the language most widely used by engineers and most portable between computers. All of the programs are suitable for PCs, minicomputers, or mainframes and are available on disk. Another important feature of this book is its use of both traditional and SI units. Many examples through the text are worked in both sets of units. The data and results for every example are also shown in both types of units. Mechanics of Solids is intended for use in a first course in mechanics of solids offered to undergraduates. An Instructor's Manual containing solutions to every problem in the book is available.

Mechanics of Solids

Elasticity, plasticity, damage mechanics and cracking are all phenomena that determine the resistance of solids to deformation and fracture. The authors of this book discuss a modern method of mathematically modeling the behavior of macroscopic volume elements. The first three chapters review physical mechanisms at the microstructural level, thermodynamics of irreversible processes, mechanics of continuous media, and the classification of the behavior of solids. The rest of the book is devoted to the modeling of different types of material behavior. In each case the authors present characteristic data for numerous materials, and discuss the physics underlying the phenomena together with methods for the numerical analysis of the resulting equations.

Intermediate Solid Mechanics

Experimental solid mechanics is the study of materials to determine their physical properties. This study might include performing a stress analysis or measuring the extent of displacement, shape, strain and stress which a material suffers under controlled conditions. In the last few years there have been remarkable developments in experimental techniques that measure shape, displacement and strains and these sorts of experiments are increasingly conducted using computational techniques. Experimental Mechanics of Solids is a comprehensive introduction to the topics, technologies and methods of experimental mechanics of solids. It begins by establishing the fundamentals of continuum mechanics,

explaining key areas such as the equations used, stresses and strains, and two and three dimensional problems. Having laid down the foundations of the topic, the book then moves on to look at specific techniques and technologies with emphasis on the most recent developments such as optics and image processing. Most of the current computational methods, as well as practical ones, are included to ensure that the book provides information essential to the reader in practical or research applications. Key features: Presents widely used and accepted methodologies that are based on research and development work of the lead author Systematically works through the topics and theories of experimental mechanics including detailed treatments of the Moire, Speckle and holographic optical methods Includes illustrations and diagrams to illuminate the topic clearly for the reader Provides a comprehensive introduction to the topic, and also acts as a quick reference guide This comprehensive book forms an invaluable resource for graduate students and is also a point of reference for researchers and practitioners in structural and materials engineering.

Engineering Mechanics of Solids

Mechanics of Solids and Materials intends to provide a modern and integrated treatment of the foundations of solid mechanics as applied to the mathematical description of material behavior. The 2006 book blends both innovative (large strain, strain rate, temperature, time dependent deformation and localized plastic deformation in crystalline solids, deformation of biological networks) and traditional (elastic theory of torsion, elastic beam and plate theories, contact mechanics) topics in a coherent theoretical framework. The extensive use of transform methods to generate solutions makes the book also of interest to structural, mechanical, and aerospace engineers. Plasticity theories, micromechanics, crystal plasticity, energetics of elastic systems, as well as an overall review of math and thermodynamics are also covered in the book.

Engineering Mechanics of Deformable Solids

This text is the primary recommendation of the UK Engineering Council Faculty of Technology to all British universities as of approved standard and quality for use as a text for the Board's own examinations. It introduces the fundamental concepts and principles of statics and stress analysis as the essential reading for first year engineering students. Worked examples from the authors experience reinforce comprehension of key concepts. Tutorial solutions with explanation in extended detail have been provided for students. Key elements include: use of free-body diagrams to help problem solving; coverage of composite materials; torsion of circular and non-circular sections; and the matrix-displacement method. Introduces the fundamental concepts and principles of statistics and stress analysis and applies these concepts and principles to a large number of practical problems The primary recommendation of the UK Engineering Council Faculty of Technology to all British universities

Mechanics of Solids and Structures, Second Edition

Engineering Solid Mechanics bridges the gap between elementary approaches to strength of materials and more advanced, specialized versions on the subject. The book provides a basic understanding of the fundamentals of elasticity and plasticity, applies these fundamentals to solve analytically a spectrum of engineering problems, and introduces advanced topics of mechanics of materials - including fracture mechanics, creep, superplasticity, fiber reinforced composites, powder compacts, and porous solids. Text includes: stress and strain, equilibrium, and compatibility elastic stress-strain relations the elastic problem and the stress function approach to solving plane elastic problems applications of the stress function solution in Cartesian and polar coordinates Problems of elastic rods, plates, and shells through formulating a strain compatibility function as well as applying energy methods Elastic and elastic-plastic fracture mechanics Plastic and creep deformation Inelastic deformation and its applications This book presents the material in an instructive manner, suitable for individual self-study. It emphasizes analytical treatment of the subject, which is essential for handling modern numerical methods as well as assessing and creating software packages. The authors provide generous explanations, systematic derivations, and detailed discussions, supplemented by a vast variety of problems and solved examples. Primarily written for professionals and students in mechanical engineering, Engineering Solid Mechanics also serves persons in other fields of engineering, such as aerospace, civil, and material engineering.

Nonlinear Continuum Mechanics of Solids

Soft Solids

Continuum Mechanics of Solids is an introductory text for graduate students in the many branches of engineering, covering the basics of kinematics, equilibrium, and material response. As an introductory book, most of the emphasis is upon the kinematically linear theories of elasticity, plasticity, and viscoelasticity, with two additional chapters devoted to topics in finite elasticity. Further chapters cover topics in fracture and fatigue and coupled field problems, such as thermoelasticity, chemoelasticity, poroelasticity, and piezoelectricity. There is ample material for a two semester course, or by selecting only topics of interest for a one-semester offering. The text includes numerous examples to aid the student. A companion text with over 180 fully worked problems is also available.

Methods of Fundamental Solutions in Solid Mechanics

Continuum Mechanics of Solids

Mechanics of Solids

As the theories and methods have evolved over the years, the mechanics of solid bodies has become unduly fragmented. Most books focus on specific aspects, such as the theories of elasticity or plasticity, the theories of shells, or the mechanics of materials. While a narrow focus serves immediate purposes, much is achieved by establishing the common foundations and providing a unified perspective of the discipline as a whole. Mechanics of Solids and Shells accomplishes these objectives. By emphasizing the underlying assumptions and the approximations that lead to the mathematical formulations, it offers a practical, unified presentation of the foundations of the mechanics of solids, the behavior of deformable bodies and thin shells, and the properties of finite elements. The initial chapters present the fundamental kinematics, dynamics, energetics, and behavior of materials that build the foundation for all of the subsequent developments. These are presented in full generality without the usual restrictions on the deformation. The general principles of work and energy form the basis for the consistent theories of shells and the approximations by finite elements. The final chapter views the latter as a means of approximation and builds a bridge between the mechanics of the continuum and the discrete assembly. Expressly written for engineers, Mechanics of Solids and Shells forms a reliable source for the tools of analysis and approximation. Its constructive presentation clearly reveals the origins, assumptions, and limitations of the methods described and provides a firm, practical basis for the use of those methods.

Mechanics of Solids

In the recent decades, computational procedures have been applied to an increasing extent in engineering and the physical sciences. Mostly, two separate fields have been considered, namely, the analysis of solids and structures and the analysis of fluid flows. These continuous advances in analyses are of much interest to physicists, mathematicians and in particular, engineers. Also, computational fluid and solid mechanics are no longer treated as entirely separate fields of applications, but instead, coupled fluid and solid analysis is being pursued. The objective of the Book Series is to publish monographs, textbooks, and proceedings of conferences of archival value, on any subject of computational fluid dynamics, computational solid and structural mechanics, and computational multi-physics dynamics. The publications are written by and for physicists, mathematicians and engineers and are to emphasize the modeling, analysis and solution of problems in engineering.

Mechanics of Solids and Fluids

A popular text in its first edition, Mechanics of Solids and Structures serves as a course text for the senior/graduate (fourth or fifth year) courses/modules in the mechanics of solid/advanced strength of materials, offered in aerospace, civil, engineering science, and mechanical engineering departments. Now, Mechanics of Solid and Structure, Second Edition presents the latest developments in computational methods that have revolutionized the field, while retaining all of the basic principles and foundational information needed for mastering advanced engineering mechanics. Key changes to the second edition include full-color illustrations throughout, web-based computational material, and the addition of a new chapter on the energy methods of structural mechanics. Using authoritative, yet accessible language, the authors explain the construction of expressions for both total potential energy and complementary potential energy associated with structures. They explore how the principles of minimal total potential energy and complementary energy provide the means to obtain governing equations of the structure, as well as a means to determine point forces and displacements with ease using Castigliano’s Theorems I and II. The material presented in this chapter also provides a deeper understanding of the finite element method, the most popular method for solving structural mechanics problems. Integrating computer techniques and programs into the body of the text, all chapters offer exercise problems for further understanding. Several appendices provide examples, answers to select problems, and opportunities for investigation into complementary topics. Listings of computer programs discussed are available on the CRC Press website.

Elementary Mechanics of Solids

Based on class-tested material, this concise yet comprehensive treatment of the fundamentals of solid mechanics is ideal for those taking single-semester courses on the subject. It provides interdisciplinary coverage of the key topics, combining solid mechanics with structural design applications, mechanical behavior of materials, and the finite element method. Part I covers basic theory, including the analysis of stress and strain, Hooke's law, and the formulation of boundary-value problems in Cartesian and cylindrical coordinates. Part II covers applications, from solving boundary-value problems, to energy methods and failure criteria, two-dimensional plane stress and strain problems, antiplane shear, contact problems, and much more. With a wealth of solved examples, assigned exercises, and 130 homework problems, and a solutions manual available online, this is ideal for senior undergraduates studying solid mechanics, and graduates taking introductory courses in solid mechanics and theory of elasticity, across aerospace, civil and mechanical engineering, and materials science.

Experimental Mechanics of Solids

from reviews of the first edition "This book is a comprehensive treatise with a significant application to structural mechanics_ the author has provided sufficient applications of the theoretical principles_ such a connection between theory

and application is a common theme and quite an attractive feature._ The book is a unique volume which contains information not easily found throughout the related literature." _ APPL. MECH. REV. This text, suitable for courses on fluid and solid mechanics, continuum mechanics, and strength of materials, offers a unified presentation of the theories and practical principles common to all branches of solid and fluid mechanics. For the student, each chapter proceeds from basic material to advanced topics usually covered at the graduate level. The presentation is self -contained, the only prerequisites are the basic algebra and analysis that are usually taught in the first and second years of an undergraduate engineering curriculum. Extensive problem sets, new in this edition, make the text more useful than before. For the practicing engineer, Mechanics of Solids and Fluids provides an up-to-date synopsis of the principles of solid and fluid mechanics combined with illustrative examples. The conservation laws for mass, momentum and energy are considered for both material and control volumes. The discussion of elastostatics includes thermal stress analysis and is extended to linear viscoelasticity by means of the correspondence principle. The Ritz-

Nonlinear Solid Mechanics

Mechanics of Solids and Materials

The aim of the book is the presentation of the fundamental mathematical and physical concepts of continuum mechanics of solids in a unified description so as to bring young researchers rapidly close to their research area. Accordingly, emphasis is given to concepts of permanent interest, and details of minor importance are omitted. The formulation is achieved systematically in absolute tensor notation, which is almost exclusively used in modern literature. This mathematical tool is presented such that study of the book is possible without permanent reference to other works.

Continuum Mechanics of Solids

Methods of Fundamental Solutions in Solid Mechanics presents the fundamentals of continuum mechanics, the foundational concepts of the MFS, and methodologies and applications to various engineering problems. Eight chapters give an overview of meshless methods, the mechanics of solids and structures, the basics of fundamental solutions and radical basis functions, meshless analysis for thin beam bending, thin plate bending, two-dimensional elastic, plane piezoelectric problems, and heat transfer in heterogeneous media. The book presents a working knowledge of the MFS that is aimed at solving real-world engineering problems through an understanding of the physical and mathematical characteristics of the MFS and its applications. Explains foundational concepts for the method of fundamental solutions (MFS) for the advanced numerical analysis of solid mechanics and heat transfer Extends the application of the MFS for use with complex problems

Considers the majority of engineering problems, including beam bending, plate bending, elasticity, piezoelectricity and heat transfer Gives detailed solution procedures for engineering problems Offers a practical guide, complete with engineering examples, for the application of the MFS to real-world physical and engineering challenges

Engineering Mechanics

This expanded second edition presents in one text the concepts and processes covered in statics and mechanics of materials curricula following a systematic, topically integrated approach. Building on the novel pedagogy of fusing concepts covered in traditional undergraduate courses in rigid-body statics and deformable body mechanics, rather than simply grafting them together, this new edition develops further the authors' very original treatment of solid mechanics with additional figures, an elaboration on selected solved problems, and additional text as well as a new subsection on viscoelasticity in response to students' feedback. Introduction to Solid Mechanics: An Integrated Approach, Second Edition, offers a holistic treatment of the depth and breadth of solid mechanics and the inter-relationships of its underlying concepts. Proceeding from first principles to applications, the book stands as a whole greater than the sum of its parts.

Mechanics of Solids and Shells

This textbook presents the physical principles pertinent to the mathematical modeling of soft materials used in engineering practice, including both man-made materials and biological tissues. It is intended for seniors and masters-level graduate students in engineering, physics or applied mathematics. It will also be a valuable resource for researchers working in mechanics, biomechanics and other fields where the mechanical response of soft solids is relevant. Soft Solids: A Primer to the Theoretical Mechanics of Materials is divided into two parts. Part I introduces the basic concepts needed to give both Eulerian and Lagrangian descriptions of the mechanical response of soft solids. Part II presents two distinct theories of elasticity and their associated theories of viscoelasticity. Seven boundary-value problems are studied over the course of the book, each pertaining to an experiment used to characterize materials. These problems are discussed at the end of each chapter, giving students the opportunity to apply what they learned in the current chapter and to build upon the material in prior chapters.

Introduction to Mechanics of Solids

Solid Mechanics

Three subjects of major interest in one textbook: linear elasticity, mechanics of structures in linear isotropic elasticity, and nonlinear mechanics including computational algorithms. After the simplest possible, intuitive approach there follows the mathematical formulation and analysis, with computational methods occupying a good portion of the book. There are several worked-out problems in each chapter and additional exercises at the end of the book, plus mathematical expressions are bery often given in more than one notation. The book is intended primarily for students and practising engineers in mechanical and civil engineering, although students and experts from applied mathematics, materials science and other related fields will also find it useful.

Mechanics of Solid Polymers

Engineering Solid Mechanics

Mechanics of Solids is designed to fulfill the needs of the mechanics of solids or strength of materials courses that are offered to undergraduate students of mechanical, civil, aeronautics and chemical engineering during the second and third semesters. The book has been thoroughly revised with multiple-choice questions, examples and exercises to match the syllabi requirement of various universities across the country.