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History of Strength of Materials - Stephen Timoshenko 1983-01-01

Strength of materials is that branch of engineering concerned with the deformation and disruption of solids when forces other than changes in position or equilibrium are acting upon them. The development of our understanding of the strength of materials has enabled engineers to establish the forces which can safely be imposed on structure or components, or to choose materials appropriate to the necessary dimensions of structures and components which have to withstand given loads without suffering effects deleterious to their proper functioning. This excellent historical survey of the strength of materials with many references to the theories of elasticity and structures is based on an extensive series of lectures delivered by the author at Stanford University, Palo Alto, California. Timoshenko explores the early roots of the discipline from the great monuments and pyramids of ancient Egypt through the temples, roads, and fortifications of ancient Greece and Rome. The author fixes the formal beginning of the modern science of the strength of materials with the publications of Galileo's book, "Two Sciences," and traces the rise and development as well as industrial and commercial applications of the fledgling science from the seventeenth century through the twentieth century. Timoshenko fleshes out the bare bones of mathematical theory with lucid demonstrations of important equations and brief biographies of highly influential mathematicians, including: Euler, Lagrange, Navier, Thomas Young, Saint-Venant, Franz Neumann, Maxwell, Kelvin, Rayleigh, Klein, Prandtl, and many others. These theories, equations, and biographies are further enhanced by clear discussions of the development of engineering and engineering education in Italy, France, Germany, England, and elsewhere. 245 figures.

Electromechanics and MEMS - Thomas B. Jones 2013-05-02

Offering a consistent, systematic approach to capacitive, piezoelectric and magnetic MEMS, from basic electromechanical transducers to high-level models for sensors and actuators, this comprehensive textbook equips graduate and senior-level undergraduate students with all the resources necessary to design and develop practical, system-level MEMS models. The concise yet thorough treatment of the underlying principles of electromechanical transduction provides a solid theoretical framework for this development, with each new topic related back to the core concepts. Repeated references to the shared commonalities of all MEMS encourage students to develop a systems-based design perspective. Extensive use is made of easy-to-interpret electrical and mechanical analogs, such as electrical circuits, electromechanical two-port models and the cascade paradigm. Each chapter features worked examples and numerous problems, all designed to test and extend students' understanding of the key principles.

Mechanics Materials Ed3 - James M. Gere 1990-04-01

Applied Mechanics - L. C. Zhang 2002

This book contains the proceedings of the Third Australasian Congress on Applied Mechanics (ACAM2002). The Congress was held to provide an international forum for researchers, industry practitioners, engineers and postgraduate scholars to exchange and disseminate knowledge and experience of the most recent advances with a focus on the behaviour of solids. Topics include: biomechanics; constitutive modelling; damage; fracture; fatigue; dynamics; impact; vibration; geo-mechanics; tribology; machining and more.

Mastering Uncertainty in Mechanical Engineering - Peter F. Pelz 2021-10-11

This open access book reports on innovative methods, technologies and strategies for mastering uncertainty in technical systems. Despite the fact that current research on uncertainty is mainly focusing on uncertainty quantification and analysis, this book gives emphasis to innovative ways to master uncertainty in engineering design, production and product usage alike. It gathers authoritative contributions by more than 30 scientists reporting on years of research in the areas of engineering, applied mathematics and law, thus offering a timely, comprehensive and multidisciplinary account of theories and methods for quantifying data, model and structural uncertainty, and of fundamental strategies for mastering uncertainty. It covers key concepts such as robustness, flexibility and resilience in detail. All the described methods, technologies and strategies have been validated with the help of three technical systems, i.e. the Modular Active Spring-Damper System, the Active Air Spring and the 3D Servo Press, which have been in turn developed and tested during more than ten years of cooperative research. Overall, this book offers a timely, practice-oriented reference guide to graduate students, researchers and professionals dealing with uncertainty in the broad field of mechanical engineering.

RF MEMS - Gabriel M. Rebeiz 2004-02-06

Ultrasmall Radio Frequency and Micro-wave Microelectromechanical systems (RF MEMs), such as switches, varactors, and phase shifters, exhibit nearly zero power consumption or loss. For this reason, they are being developed intensively by corporations worldwide for use in telecommunications equipment. This book acquaints readers with the basics of RF MEMs and describes how to design practical circuits and devices with them. The author, an acknowledged expert in the field, presents a range of real-world applications and shares many valuable tricks of the trade.

Introduction to Engineering Mechanics - Clive L. Dym 2008-11-10

The essence of continuum mechanics- the internal response of materials to external loading- is often obscured by the complex mathematics of its formulation. By building gradually from one-dimensional to two- and three-dimensional formulations, this book provides an accessible introduction to the fundamentals of solid and fluid mechanics, covering s

Analytical Estimates of Structural Behavior - Clive L. Dym 2012-02-10

Explicitly reintroducing the idea of modeling to the analysis of structures, Analytical Estimates of Structural Behavior presents an integrated approach to modeling and estimating the behavior of structures. With the increasing reliance on computer-based approaches in structural analysis, it is becoming even more important for structural engineers to recognize that they are dealing with models of structures, not with the actual structures. As tempting as it is to run innumerable simulations, closed-form estimates can be effectively used to guide and check numerical results, and to confirm physical insights and intuitions. Spend Less Time Generating Numbers, and More Time Understanding What They Mean This book encourages readers to think about structures and their models in a way that is rooted in classic elementary elasticity—depending less on advanced mathematical techniques and more on the dimensions and magnitudes of the underlying physics. The authors stretch the mold, emphasizing and more explicitly describing the modeling process. The focus is on learning which calculations to perform and how to validate and interpret the results—skills that will be increasingly useful for professional engineers. Chapters cover: Key principles and techniques of mathematical modeling, including dimensional analysis, scaling, linearity,

and balance and conservation laws Basic structural models How to develop and express physical intuition How to track the behavior of arches under lateral load Two methods of analyzing coupled discrete systems—Castigliano's theorems and Rayleigh's quotient—to lay a foundation for their application to continuous systems How to derive simple, accurate estimates of the transverse displacements of structures modeled in terms of coupled Timoshenko beams How to analyze the dimensional behavior and calculate numerical values of fundamental frequencies of structures modeled in terms of Euler-Bernoulli, Timoshenko, and coupled-beam systems Taking a unique approach, Analytical Estimates of Structural Behavior is suitable for advanced undergraduates, as well as graduate students and practitioners, who want to spend less time and effort generating numbers, and more time understanding what those numbers mean.

Structures and Fracture ebook Collection - Uwe Zerbst 2008-09-08

Structures and Fracture ebook Collection contains 5 of our best-selling titles, providing the ultimate reference for every structural engineer's library. Get access to over 3000 pages of reference material, at a fraction of the price of the hard-copy books. This CD contains the complete ebooks of the following 5 titles: Zerbst, Fitness-for-Service Fracture Assessment for Structures, 9780080449470 Giurgiutiu, Structural Health Monitoring, 9780120887606 Fahy, Sound & Structural Vibration 2nd Edition, 9780123736338 Yang, Stress, Strain and Structural Dynamics, 9780127877679 Ravi-Chandar, Dynamic Fracture, 9780080443522 *Five fully searchable titles on one CD providing instant access to the ULTIMATE library of engineering materials for structural engineers and professionals. *3000 pages of practical and theoretical structural dynamics and fracture information in one portable package. *Incredible value at a fraction of the cost of the print books

Mechanics of Materials, 2e - Gere; Timoshenko 2006-02-01

Mechanics of Materials - Barry J. Goodno 2021

Develop a thorough understanding of the mechanics of materials - an area essential for success in mechanical, civil and structural engineering -- with the analytical approach and problem-solving emphasis found in Goodno/Gere's leading MECHANICS OF MATERIALS, Enhanced, SI, 9th Edition. This book focuses on the analysis and design of structural members subjected to tension, compression, torsion and bending. This ENHANCED EDITION guides you through a proven four-step problem-solving approach for systematically analyzing, dissecting and solving structure design problems and evaluating solutions. Memorable examples, helpful photographs and detailed diagrams and explanations demonstrate reactive and internal forces as well as resulting deformations. You gain the important foundation you need to pursue further study as you practice your skills and prepare for the FE exam.

Introduction to Engineering Mechanics - Jenn Stroud Rossmann 2015-03-24

Integrated Mechanics Knowledge Essential for Any Engineer Introduction to Engineering Mechanics: A Continuum Approach, Second Edition uses continuum mechanics to showcase the connections between engineering structure and design and between solids and fluids and helps readers learn how to predict the effects of forces, stresses, and strains. T

MEMS and Nanotechnology, Volume 5 - Gordon Shaw III 2013-09-17

MEMS and Nanotechnology, Volume 5: Proceedings of the 2013 Annual Conference on Experimental and Applied Mechanics, the fifth volume of eight from the Conference, brings together contributions to this important area of research and engineering. The collection presents early findings and case studies on a wide range of areas, including: Microelectronics Packaging Single Atom/Molecule Mechanical Testing MEMS Devices & Fabrication In-Situ Mechanical Testing Nanoindentation Experimental Analysis of Low-Dimensional Materials for Nanotechnology

Introduction to Transonic Aerodynamics - Roelof Vos 2015-03-04

Written to teach students the nature of transonic flow and its mathematical foundation, this book offers a much-needed introduction to transonic aerodynamics. The authors present a quantitative and qualitative assessment of subsonic, supersonic and transonic flow around bodies in two and three dimensions. The book reviews the governing equations and explores their applications and limitations as employed in modeling and computational fluid dynamics. Some concepts, such as shock and expansion theory, are examined from a numerical perspective. Others, including shock-boundary-layer interaction, are discussed

from a qualitative point of view. The book includes 60 examples and more than 200 practice problems. The authors also offer analytical methods such as Method of Characteristics (MOC) that allow readers to practice with the subject matter. The result is a wealth of insight into transonic flow phenomena and their impact on aircraft design, including compressibility effects, shock and expansion waves, shock-boundary-layer interaction and aeroelasticity.

Risk-Based Reliability Analysis and Generic Principles for Risk Reduction - Michael T. Todinov 2006-11-03

This book has been written with the intention to fill two big gaps in the reliability and risk literature: the risk-based reliability analysis as a powerful alternative to the traditional reliability analysis and the generic principles for reducing technical risk. An important theme in the book is the generic principles and techniques for reducing technical risk. These have been classified into three major categories: preventive (reducing the likelihood of failure), protective (reducing the consequences from failure) and dual (reducing both, the likelihood and the consequences from failure). Many of these principles (for example: avoiding clustering of events, deliberately introducing weak links, reducing sensitivity, introducing changes with opposite sign, etc.) are discussed in the reliability literature for the first time. Significant space has been allocated to component reliability. In the last chapter of the book, several applications are discussed of a powerful equation which constitutes the core of a new theory of locally initiated component failure by flaws whose number is a random variable. Offers a shift in the existing paradigm for conducting reliability analyses Covers risk-based reliability analysis and generic principles for reducing risk Provides a new measure of risk based on the distribution of the potential losses from failure as well as the basic principles for risk-based design Incorporates fast algorithms for system reliability analysis and discrete-event simulators Includes the probability of failure of a structure with complex shape expressed with a simple equation

Experimental Characterization of Advanced Composite Materials - Leif A. Carlsson 2002-10-29

Over much of the last three decades, the evolution of techniques for characterizing composite materials has struggled to keep up with the advances of composite materials themselves and their broadening areas of application. In recent years, however, much work has been done to consolidate test methods and better understand those being used. Finally,

Mechanics of Materials, Brief SI Edition - James M. Gere 2011-04-12

MECHANICS OF MATERIALS BRIEF EDITION by Gere and Goodno presents thorough and in-depth coverage of the essential topics required for an introductory course in Mechanics of Materials. This user-friendly text gives complete discussions with an emphasis on need to know material with a minimization of nice to know content. Topics considered beyond the scope of a first course in the subject matter have been eliminated to better tailor the text to the introductory course. Continuing the tradition of hallmark clarity and accuracy found in all 7 full editions of Mechanics of Materials, this text develops student understanding along with analytical and problem-solving skills. The main topics include analysis and design of structural members subjected to tension, compression, torsion, bending, and more. How would you briefly describe this book and its package to an instructor? What problems does it solve? Why would an instructor adopt this book? Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Pan Vascular Medicine - Peter Lanzer 2013-12-20

The textbook provides an interdisciplinary and integrated perspective of modern vascular cure. Written by experts the text proceeds from fundamental principles to advanced concepts. The book is divided into four parts, each focusing on different basic concepts of vascular cure. All fundamental principles of the area are clearly explained to facilitate vascular diagnostics and treatment in clinical practice. It is aimed at junior practitioners and experts.

Experimental Characterization of Advanced Composite Materials, Fourth Edition - Leif A. Carlsson 2014-03-05

Over the last three decades, the evolution of techniques for the experimental testing of composite materials has struggled to keep up with the advances and broadening areas of application of the composite materials themselves. In recent years, however, much work has been done to consolidate and better understand the

test methods being used. Finally, a consensus regarding the best available methods exists, and definitive recommendations can be made. *Experimental Characterization of Advanced Composite Materials* provides a succinct, authoritative treatment of the best available methods for determining the mechanical properties, thermal expansion coefficients, and fracture and strength data for composite materials. With an emphasis firmly on practical matters, it presents processing techniques, specimen preparation, analyses of test methods, test procedures, and data reduction schemes. Five chapters covering specific aspects of lamina testing are followed by discussions extending those principles to laminate responses. The treatment concludes by exploring composite durability issues with a detailed examination of defects and fracture mechanics. The Fourth Edition is revised to include: New figures, updated ASTM standards, and an expanded index Major additions in processing of thermoset resins, neat resin tests, sandwich structures, cure analyses, damage tolerance tests, single fiber tests, fiber matrix interface tests, interlaminar tension tests, through-thickness tension and compression tests, open-hole compression tests, falling weight impact tests, compression-after-impact tests, sandwich beam and core tests, and more With its concise format, detailed procedures, and expert assessments, this book is an outstanding resource for composites manufacturing and test engineers, lab technicians, and other industry professionals, as well as students, academia, and government research and engineering organizations. It brings together all of the most appropriate and widely accepted test methods developed to date.

Flexonics for Manufacturing and Robotics - Jiajie Guo 2018-12-31

This book presents the theoretical research and application results of a study on flexible mechatronics (flexonics). Formulating distributed models in both time and spatial domains using a geometric approach, it presents a simple yet practical field-based sensing method for robotics and manufacturing, and illustrates its applications with examples such as exoskeletons, mobile sensor network and intelligent sensing. The book is of interest to researchers, engineers and graduate students in robotics, manufacturing and automation engineering who wish to learn the core principles, theories, technologies, and applications of flexonics.

MEMS: A Practical Guide of Design, Analysis, and Applications - Jan Korvink 2010-05-28

A new generation of MEMS books has emerged with this cohesive guide on the design and analysis of micro-electro-mechanical systems (MEMS). Leading experts contribute to its eighteen chapters that encompass a wide range of innovative and varied applications. This publication goes beyond fabrication techniques covered by earlier books and fills a void created by a lack of industry standards. Subjects such as transducer operations and free-space microsystems are contained in its chapters. Satisfying a demand for literature on analysis and design of microsystems the book deals with a broad array of industrial applications. This will interest engineering and research scientists in industry and academia.

Structural Analysis of Polymeric Composite Materials, Second Edition - Mark E. Tuttle 2012-12-03

Structural Analysis of Polymeric Composite Materials, Second Edition introduces the mechanics of composite materials and structures and combines classical lamination theory with macromechanical failure principles for prediction and optimization of composite structural performance. It addresses topics such as high-strength fibers, manufacturing techniques, commercially available compounds, and the behavior of anisotropic, orthotropic, and transversely isotropic materials and structures subjected to complex loading. Emphasizing the macromechanical (structural) level over micromechanical issues and analyses, this unique book integrates effects of environment at the outset to establish a coherent and updated knowledge base. In addition, each chapter includes example problems to illustrate the concepts presented.

Structural Analysis of Polymeric Composite Materials - Mark E. Tuttle 2003-11-07

Structural Analysis of Polymeric Composite Materials studies the mechanics of composite materials and structures and combines classical lamination theory with macromechanical failure principles for prediction and optimization of composite structural performance. This reference addresses topics such as high-strength fibers, commercially-available comp

Mechanics of Materials - Christopher Jenkins 2005-03-15

& Quot;The unifying treatment of structural design presented here should prove useful to any engineer involved in the design of structures. A crucial divide to be bridged is that between applied mechanics and materials science. The onset of specialization and the rapid rise of technology, however, have created

separate disciplines concerned with the deformation of solid materials. Unfortunately, the result is in many cases that society loses out on having at their service efficient, high-performance material/structural systems. & quot; & quot;We follow in this text a very methodological process to introduce mechanics, materials, and design issues in a manner called total structural design. The idea is to seek a solution in & quot;total design space. & quot; & quot;The material presented in this text is suitable for a first course that encompasses both the traditional mechanics of materials and properties of materials courses. The text is also appropriate for a second course in mechanics of materials or a follow-on course in design of structures, taken after the typical introductory mechanics and properties courses. This text can be adapted to several different curriculum formats, whether traditional or modern. Instructors using the text for a traditional course may find that the text in fact facilitates transforming their course over time to a more modern, integrated approach. & quot;--BOOK JACKET.

Introductory MEMS - Thomas M. Adams 2009-12-08

Introductory MEMS: Fabrication and Applications is a practical introduction to MEMS for advanced undergraduate and graduate students. Part I introduces the student to the most commonly used MEMS fabrication techniques as well as the MEMS devices produced using these techniques. Part II focuses on MEMS transducers: principles of operation, modeling from first principles, and a detailed look at commercialized MEMS devices, in addition to microfluidics. Multiple field-tested laboratory exercises are included, designed to facilitate student learning about the fundamentals of microfabrication processes. References, suggested reading, review questions, and homework problems are provided at the close of each chapter. *Introductory MEMS: Fabrication and Applications* is an excellent introduction to the subject, with a tested pedagogical structure and an accessible writing style suitable for students at an advanced undergraduate level across academic disciplines.

Theory of Elastic Stability - Stephen P. Timoshenko 2012-05-04

Written by world-renowned authorities on mechanics, this classic ranges from theoretical explanations of 2- and 3-D stress and strain to practical applications such as torsion, bending, and thermal stress. 1961 edition.

Strength of Materials - Surya Patnaik 2004

Determinate truss -- Simple beam -- Determinate shaft -- Simple frames -- Indeterminate truss -- Indeterminate beam -- Indeterminate shaft -- Indeterminate frame -- Two-dimensional structures -- Column buckling -- Energy theorems -- Finite element method -- Special topics.

Handbook of Micromechanics and Nanomechanics - Shaofan Li 2016-04-19

This book presents the latest developments and applications of micromechanics and nanomechanics. It particularly focuses on some recent applications and impact areas of micromechanics and nanomechanics that have not been discussed in traditional micromechanics and nanomechanics books on metamaterials, micromechanics of ferroelectric/piezoelectric, electromagnetic materials, micromechanics of interface, size effects and strain gradient theories, computational and experimental nanomechanics, multiscale simulations and theories, soft matter composites, and computational homogenization theory. This book covers analytical, experimental, as well as computational and numerical approaches in depth.

Engineering Mechanics of Materials - B.B. Muvdi 2012-12-06

4. 2 Solid Circular Shafts-Angle of Twist and Shearing Stresses 159 4. 3 Hollow Circular Shafts-Angle of Twist and Shearing Stresses 166 4. 4 Principal Stresses and Strains Associated with Torsion 173 4. 5 Analytical and Experimental Solutions for Torsion of Members of Noncircular Cross Sections 179 4. 6 Shearing Stress-Strain Properties 188 *4. 7 Computer Applications 195 5 Stresses in Beams 198 5. 1 Introduction 198 5. 2 Review of Properties of Areas 198 5. 3 Flexural Stresses due to Symmetric Bending of Beams 211 5. 4 Shear Stresses in Symmetrically Loaded Beams 230 *5. 5 Flexural Stresses due to Unsymmetric Bending of Beams 248 *5. 6 Computer Applications 258 Deflections of Beams 265 I 6. 1 Introduction 265 6. 2 Moment-Curvature Relationship 266 6. 3 Beam Deflections-Two Successive Integrations 268 6. 4 Derivatives of the Elastic Curve Equation and Their Physical Significance 280 6. 5 Beam Deflections-The Method of Superposition 290 6. 6 Construction of Moment Diagrams by Cantilever Parts 299 6. 7 Beam Deflections-The Area-Moment Method 302 *6. 8 Beam Deflections-Singularity Functions 319 *6. 9 Beam Deflections-Castigliano's Second Theorem 324 *6. 10 Computer Applications 332

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Structures: Theory and Analysis - Martin Williams 2020-03-26

A comprehensive textbook that encompasses the full range of material covered in undergraduate courses in Structures in departments of Civil and Mechanical Engineering. The approach taken aims to integrate a qualitative approach - looking at the physical reality of phenomena - with a quantitative approach - one that models the physical reality mathematically. An innovative introductory chapter looks at different types of structures - from the commonplace, such as chairs and aeroplanes, and the historically significant, such as the Pont du Gard in southern France, through to modern and novel structures such as the Bank of China building in Hong Kong - with a view to enthusing the reader into further study.

Stress, Strain, and Structural Dynamics - Bingen Yang 2022-09-13

Stress, Strain, and Structural Dynamics: An Interactive Handbook of Formulas, Solutions, and MATLAB Toolboxes, Second Edition is the definitive reference to statics and dynamics of solids and structures, including mechanics of materials, structural mechanics, elasticity, rigid-body dynamics, vibrations, structural dynamics, and structural controls. The book integrates the development of fundamental theories, formulas, and mathematical models with user-friendly interactive computer programs that are written in MATLAB. This unique merger of technical reference and interactive computing provides instant solutions to a variety of engineering problems, and in-depth exploration of the physics of deformation, stress and motion by analysis, simulation, graphics, and animation. Combines knowledge of solid mechanics with relevant mathematical physics, offering viable solution schemes Covers new topics such as static analysis of space trusses and frames, vibration analysis of plane trusses and frames, transfer function formulation of vibrating systems, and more Empowers readers to better integrate and understand the physical principles of classical mechanics, the applied mathematics of solid mechanics, and computer methods Includes a companion website that features MATLAB exercises for solving a wide range of complex engineering analytical problems using closed-solution methods to test against numerical and other open-ended methods

An Introduction to Mechanical Engineering - Jonathan Wickert 2016-01-01

AN INTRODUCTION TO MECHANICAL ENGINEERING, 4E introduces readers to today's ever-emerging field of mechanical engineering as it instills an appreciation for how engineers design hardware that builds and improves societies around the world. This book is ideal for those completing their first or second year in a college or university's mechanical engineering program. It is also useful for those studying a closely related field. The authors effectively balance timely treatments of technical problem-solving skills, design, engineering analysis, and modern technology to provide the solid mechanical engineering foundation readers need for future success. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Mechanics of Materials - Roy R. Craig, Jr. 2020-08-04

The fourth edition of Mechanics of Materials is an in-depth yet accessible introduction to the behavior of solid materials under various stresses and strains. Emphasizing the three key concepts of deformable-body mechanics—equilibrium, material behavior, and geometry of deformation—this popular textbook covers the fundamental concepts of the subject while helping students strengthen their problem-solving skills.

Throughout the text, students are taught to apply an effective four-step methodology to solve numerous example problems and understand the underlying principles of each application. Focusing primarily on the behavior of solids under static-loading conditions, the text thoroughly prepares students for subsequent courses in solids and structures involving more complex engineering analyses and Computer-Aided Engineering (CAE). The text provides ample, fully solved practice problems, real-world engineering examples, the equations that correspond to each concept, chapter summaries, procedure lists, illustrations, flow charts, diagrams, and more. This updated edition includes new Python computer code examples, problems, and homework assignments that require only basic programming knowledge.

An Introduction to Mechanical Engineering, Enhanced Edition - Jonathan Wickert 2020-01-01

Discover today's fascinating, challenging, and constantly changing field of mechanical engineering with Wickert/Lewis' ENHANCED EDITION OF AN INTRODUCTION TO MECHANICAL ENGINEERING, 4th

Edition. This engaging book helps you master technical problem-solving skills as you gain a balanced understanding of the latest design, engineering analysis, and advancements in engineering-related technology. The authors use their expertise to present engineering as a visual and graphical activity. Nearly 300 photographs and illustrations give you an exciting glimpse into what you will study in later courses and practice in your career. Meaningful content, interspersed with numerous real-world applications and interesting examples, helps you develop the solid foundation in mechanical engineering that you need for future success. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Mechanics of Materials - James M. Gere 1999

This is a revised edition emphasizing the fundamental concepts and applications of strength of materials while intending to develop students' analytical and problem-solving skills. 60% of the 1100 problems are new to this edition, providing plenty of material for self-study. New treatments are given to stresses in beams, plane stresses and energy methods. There is also a review chapter on centroids and moments of inertia in plane areas; explanations of analysis processes, including more motivation, within the worked examples.

Architected Materials in Nature and Engineering - Yuri Estrin 2019-03-27

This book deals with a group of architected materials. These are hybrid materials in which the constituents (even strongly dissimilar ones) are combined in a given topology and geometry to provide otherwise conflicting properties. The hybridization presented in the book occurs at various levels - from the molecular to the macroscopic (say, sub-centimeter) ones. This monograph represents a collection of programmatic chapters, defining archimats and summarizing the results obtained by using the geometry-inspired materials design. The area of architected or geometry-inspired materials has reached a certain level of maturity and visibility for a comprehensive presentation in book form. It is written by a group of authors who are active researchers working on various aspects of architected materials. Through its 14 chapters, the book provides definitions and descriptions of the archetypes of architected materials and addresses the various techniques in which they can be designed, optimized, and manufactured. It covers a broad realm of archimats, from the ones occurring in nature to those that have been engineered, and discusses a range of their possible applications. The book provides inspiring and scientifically profound, yet entertaining, reading for the materials science community and beyond.

Circular Cylinders and Pressure Vessels - Vincenzo Vullo 2013-11-29

This book provides comprehensive coverage of stress and strain analysis of circular cylinders and pressure vessels, one of the classic topics of machine design theory and methodology. Whereas other books offer only a partial treatment of the subject and frequently consider stress analysis solely in the elastic field, Circular Cylinders and Pressure Vessels broadens the design horizons, analyzing theoretically what happens at pressures that stress the material beyond its yield point and at thermal loads that give rise to creep. The consideration of both traditional and advanced topics ensures that the book will be of value for a broad spectrum of readers, including students in postgraduate, and doctoral programs and established researchers and design engineers. The relations provided will serve as a sound basis for the design of products that are safe, technologically sophisticated, and compliant with standards and codes and for the development of innovative applications.

An Introduction to Mechanical Engineering, SI Edition - Jonathan Wickert 2016-03-09

AN INTRODUCTION TO MECHANICAL ENGINEERING, 4E introduces readers to today's ever-emerging field of mechanical engineering as it instills an appreciation for how engineers design hardware that builds and improves societies around the world. This book is ideal for those completing their first or second year in a college or university's mechanical engineering program. It is also useful for those studying a closely related field. The authors effectively balance timely treatments of technical problem-solving skills, design, engineering analysis, and modern technology to provide the solid mechanical engineering foundation readers need for future success. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Nanoscale Phenomena in Ferroelectric Thin Films - Seungbum Hong 2004-01-31

This book presents the recent advances in the field of nanoscale science and engineering of ferroelectric

thin films. It comprises two main parts, i.e. electrical characterization in nanoscale ferroelectric capacitor, and nano domain manipulation and visualization in ferroelectric materials. Well known leading experts both in relevant academia and industry over the world (U.S., Japan, Germany, Switzerland, Korea) were invited to contribute to each chapter. The first part under the title of electrical characterization in nanoscale ferroelectric capacitors starts with Chapter 1, "Testing and characterization of ferroelectric thin film capacitors," written by Dr. I. K. Yoo. The author provides a comprehensive review on basic concepts and terminologies of ferroelectric properties and their testing methods. This chapter also covers reliability issues in FeRAMs that are crucial for commercialization of high density memory products. In Chapter 2, "Size effects in ferroelectric film capacitors: role of the film thickness and capacitor size," Dr. I. Stolichnov discusses the size effects both in in-plane and out-of-plane dimensions of the ferroelectric thin film. The author successfully relates the electric performance and domain dynamics with proposed models of charge injection and stress induced phase transition. The author's findings present both a challenging problem and the clue to its solution of reliably predicting the switching properties for ultra-thin ferroelectric capacitors. In Chapter 3, "Ferroelectric thin films for memory applications: nanoscale characterization by scanning force microscopy," Prof. A.

MECHANICS OF MATERIALS - M. A. JAYARAM 2007-08-14

This text provides undergraduate engineering students with a systematic treatment of both the theory and applications of mechanics of materials. With a strong emphasis on basic concepts and techniques throughout, the text focuses on analytical understanding of the subject by the students. An abundance of worked-out examples, depicting realistic situations encountered in engineering design, are aimed to develop skills for analysis and design of components. To broaden the student's capacity for adopting other forms of solving problems, a few typical problems are presented in C programming language at the end of each chapter. The book is primarily suitable for a one-semester course for B.E./B.Tech students and diploma-level students pursuing courses in civil engineering, mechanical engineering and its related branches of engineering profession such as production engineering, industrial engineering, automobile engineering and aeronautical engineering. The book can also be used to advantage by students of electrical engineering where an introductory course on mechanics of materials is prescribed. **KEY FEATURES** □ Includes numerous clear and easy-to-follow examples to illustrate the application of theory to practical problems. □ Provides numerous end-of-chapter problems for study and review. □ Gives summary at the end of each chapter to allow students to recapitulate the topics. □ Includes C programs with quite a few C graphics to encourage students to build up competencies in computer applications.