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Acoustics of Solids - Abraham I. Beltzer 2012-12-06
Technological developments in composite materials, non-destructive testing, and signal processing as well as biomedical applications, have stimulated wide-ranging engineering investigations of heterogeneous, anisotropic media and surface waves of different types. Wave propagation in solids is now of considerable importance in a variety of applications. The book presents many of the key results in this field and interprets them from a unified engineering viewpoint. The conceptual importance and relevance for applications were the prevailing criteria in selecting the topics. Included are body and surface waves in elastic, viscoelastic, and piezoelectric media and waveguides, with emphasis on the effects of inhomogeneity and anisotropy. The book differs in many aspects from the other monographs dealing with wave propagation in solids. It focuses on physically meaningful theoretical models, a broad spectrum of which is covered, and not on mathematical techniques. Some of the results, particularly those dealing with waves in composites, are given for the first time in the monographical literature. Both, exact and approximate approaches, are discussed. While the subject is advanced, the presentation is at an intermediate level of mathematical complexity, making understanding easier.
Wave Propagation in Structures - James F. Doyle 2012-12-06
This book introduces spectral analysis as a means of investigating wave propagation and transient oscillations in structures. After developing the foundations of spectral analysis and the fast Fourier transform algorithm, the book provides a thorough treatment of waves in rods, beams, and plates, and introduces a novel matrix method for analysing complex structures as a collection of waveguides. The presentation includes an introduction to higher-order structural theories, the results of many experimental studies, practical applications, and source-code listings for many programs. An extensive bibliography provides an entry to the research literature. Intended as a textbook for graduate students of aerospace or mechanical engineering, the book will also be of interest to practising engineers in these and related disciplines.
Nonlinear Elastic Waves in Materials - Jeremiah J. Rushchitsky 2014-04-23
The main goal of the book is a coherent treatment of the theory of propagation in materials of nonlinearly elastic waves of displacements, which corresponds to one modern line of development of the nonlinear theory of elastic waves. The book is divided on five basic parts: the necessary information on waves and materials; the necessary information on nonlinear theory of elasticity and elastic materials; analysis of one-dimensional nonlinear elastic waves of displacement – longitudinal,

vertically and horizontally polarized transverse plane nonlinear elastic waves of displacement; analysis of one-dimensional nonlinear elastic waves of displacement – cylindrical and torsional nonlinear elastic waves of displacement; analysis of two-dimensional nonlinear elastic waves of displacement – Rayleigh and Love nonlinear elastic surface waves. The book is addressed first of all to people working in solid mechanics – from the students at an advanced undergraduate and graduate level to the scientists, professionally interesting in waves. But mechanics is understood in the broad sense, when it includes mechanical and other engineering, material science, applied mathematics and physics and so forth. The genesis of this book can be found in author's years of research and teaching while a head of department at SP Timoshenko Institute of Mechanics (National Academy of Sciences of Ukraine), a member of Center for Micro and Nanomechanics at Engineering School of University of Aberdeen (Scotland) and a professor at Physical-Mathematical Faculty of National Technical University of Ukraine "KPI". The book comprises 11 chapters. Each chapter is complemented by exercises, which can be used for the next development of the theory of nonlinear waves.

Impact Wear of Materials - 1978

Engineering Viscoelasticity - Danton Gutierrez-Lemini 2013-09-12

Engineering Viscoelasticity covers all aspects of the thermo- mechanical response of viscoelastic substances that a practitioner in the field of viscoelasticity would need to design experiments, interpret test data, develop stress-strain models, perform stress analyses, design structural components, and carry out research work. The material in each chapter is developed from the elementary to the esoteric, providing the background in mathematics and mechanics that are central to understanding the subject matter being presented. This book also examines how viscoelastic materials respond to the application of loads, and provides practical guidelines to use them in the design of commercial, military and industrial applications.

Formulas for Mechanical and Structural Shock and Impact - Gregory Szuladzinski 2009-10-15

In dealing with extreme loads on structures, simple approximations of key variables can indicate if there is a threat of collapse. The ability to determine such variables early on strongly impacts the decisions about the engineering approach to adopt. Formulas for Mechanical and Structural Shock and Impact is a self-contained and concise presentation of formulas and methodology you can use to determine dynamic response to shock loads, to help you decide on the optimal design. This book offers insight into how objects and structures respond to sudden, strong—and generally short—impulses. In our computer-oriented environment, in which structural programs are used for most large analytical tasks, engineers can still benefit from certain manual calculations and analytical methods to quickly assess the situation at hand. Exploring a range of mechanical and civil engineering applications, the text enables engineers to manually calculate what happens to structures and objects when pushed, pulled, jerked, or blasted by providing ready access to formulas required for advanced problem solving. It describes relatively simple methods of dealing with many design situations, in which simple spreadsheets or MathCad are sometimes employed. These scenarios may include: Determination of preliminary figures on the anticipated dynamic response of a system that is in an early stage of design and for which a full-scale computation is not practical Preparations for physical testing or for large-scale calculations, during which a dynamic model is generated Indirect verification of computer-generated results, to explain questionable results or guard against hidden errors Structural safety can be facilitated through the use of simple approximate solutions early in the design process, often eliminating the need for complicated and more involved solutions later. This book is a valuable companion for modern engineers who need concise and relatively easy methods of hand calculation to determine the essential variables. Without emphasizing any one particular type of structure, its scope is quite broad and applies to mechanical aspects of aeronautical, automotive, nuclear, and civil engineering, as well as those in general machine design. Stressing simplicity, the author presents the theoretical basis for manual

calculations that will remain abundantly useful in the foreseeable future.

Encyclopedia of Solid Earth Geophysics - Harsh Gupta 2011-06-29

The past few decades have witnessed the growth of the Earth Sciences in the pursuit of knowledge and understanding of the planet that we live on. This development addresses the challenging endeavor to enrich human lives with the bounties of Nature as well as to preserve the planet for the generations to come. Solid Earth Geophysics aspires to define and quantify the internal structure and processes of the Earth in terms of the principles of physics and forms the intrinsic framework, which other allied disciplines utilize for more specific investigations. The first edition of the Encyclopedia of Solid Earth Geophysics was published in 1989 by Van Nostrand Reinhold publishing company. More than two decades later, this new volume, edited by Prof. Harsh K. Gupta, represents a thoroughly revised and expanded reference work. It brings together more than 200 articles covering established and new concepts of Geophysics across the various sub-disciplines such as Gravity, Geodesy, Geomagnetism, Seismology, Seismics, Deep Earth Processes, Plate Tectonics, Thermal Domains, Computational Methods, etc. in a systematic and consistent format and standard. It is an authoritative and current reference source with extraordinary width of scope. It draws its unique strength from the expert contributions of editors and authors across the globe. It is designed to serve as a valuable and cherished source of information for current and future generations of professionals.

Rock Fracture and Blasting - Zong-Xian Zhang 2016-04-26

Rock Fracture and Blasting: Theory and Applications provides the latest on stress waves, shock waves, and rock fracture, all necessary components that must be critically analyzed to maximize results in rock blasting. The positioning of charges and their capacity and sequencing are covered in this book, and must be carefully modeled to minimize impact in the surrounding environment. Through an explanation of these topics, author Professor Zhang’s experience in the field, and his theoretical knowledge, users will find a thorough guide that is not only up-to-date, but complete with a unique perspective on the field. Includes a rigorous exposition of Stress Waves and Shock Waves, as well as Rock Fracture and Fragmentation Provides both Empirical and Hybrid Stress Blasting Modeling tools and techniques for designing effective blast plans Offers advanced knowledge that enables users to choose better blast techniques Includes exercises for learning and training in each chapter

Local Mechanics Concepts for Composite Material Systems - J.N. Reddy 2013-03-08

The application of composite materials to engineering components has spurred a ma jor effort to analyze such materials and the structures made from them. Most researchers workin~ in mechanics of composite structures understand that composite materials pro vide umque advantages but also present complex and challenging problems to researchers. The complex inelastic behavior and variety of failure modes of composite structures are a result of the strength and stiffness properties of constituents and their complex interac tions. Macromechanical constitutive models based on gross composite properties cannot realistically represent local interactions, and thus have serious limitations. The composite materials that are of most interest to engineering applications are often "brittle" in their behavior, in the sense that the strength and life of the material systems is controlled or greatly influenced by events or processes which involve volumes of material whose dimen sions are small compared to the global dimensions of the element. This is also true in ductile systems where local nonlinearity may contribute to local behavior which controls global response.

Ultrasonic Guided Waves in Solid Media - Joseph L. Rose 2014-08-11

Ultrasonic guided waves in solid media are important in nondestructive testing and structural health monitoring, as new faster, more sensitive, and economical ways of looking at materials and structures have become possible. This book can be read by managers from a "black box" point of view, or used as a professional reference or textbook.

Elasticity of Materials - Ezgi Günay 2019-01-30

In the science of physics, elasticity is the ability of a deformable body (e.g., steel, aluminum, rubber, wood, crystals, etc.) to resist a distorting effect and to return to its original size and shape when that influence or

force is removed. Solid bodies will deform when satisfying forces are applied to them. Elasticity solution of materials will be grouped in forms of linear and nonlinear elasticity formulations. The main subject of this book is engineering elasticity and consists of five chapters in two main sections. These two main sections are "General Theorems in Elasticity" and "Engineering Applications in Theory of Elasticity." The first chapter of the first section belongs to the editor and is entitled "Analytical and Numerical Approaches in Engineering Elasticity." The second chapter in the first section is entitled "A General Overview of Stress-Strain Analysis for the Elasticity Equations" by P. Kumar, M. Mahanty, and A. Chattopadhyay. The first chapter of the second section is entitled "FEA and Experimental Determination of Applied Elasticity Problems for Fabricating Aspheric Surfaces" by Dr. D.N. Nguyen. The second chapter is entitled "Concept of Phase Transition Based on Elastic Systematics" by Dr. P.S. Nnamchi and Dr. C.S. Obayi. The third chapter is entitled "Repair Inspection Technique Based on Elastic-Wave Tomography Applied for Deteriorated Concrete Structures" by Dr. K. Hashimoto, Dr. T. Shiotani, Dr. T. Nishida, and Dr. N. Okude. Finally, this book includes the basic principles of elasticity and related engineering applications about theory and design.

Dynamic Behavior of Materials, Volume 1 - Vijay Chalivendra 2012-09-26
Dynamic Behavior of Materials, Volume 1: Proceedings of the 2012 Annual Conference on Experimental and Applied Mechanics represents one of seven volumes of technical papers presented at the Society for Experimental Mechanics SEM 12th International Congress & Exposition on Experimental and Applied Mechanics, held at Costa Mesa, California, June 11-14, 2012. The full set of proceedings also includes volumes on Challenges in Mechanics of Time -Dependent Materials and Processes in Conventional and Multifunctional Materials, Imaging Methods for Novel Materials and Challenging Applications, Experimental and Applied Mechanics, 2nd International Symposium on the Mechanics of Biological Systems and Materials 13th International Symposium on MEMS and Nanotechnology and, Composite Materials and the 1st International Symposium on Joining Technologies for Composites.

28th International Symposium on Shock Waves - Konstantinos Kontis 2012-03-22
The University of Manchester hosted the 28th International Symposium on Shock Waves between 17 and 22 July 2011. The International Symposium on Shock Waves first took place in 1957 in Boston and has since become an internationally acclaimed series of meetings for the wider Shock Wave Community. The ISSW28 focused on the following areas: Blast Waves, Chemically Reacting Flows, Dense Gases and Rarefied Flows, Detonation and Combustion, Diagnostics, Facilities, Flow Visualisation, Hypersonic Flow, Ignition, Impact and Compaction, Multiphase Flow, Nozzle Flow, Numerical Methods, Propulsion, Richtmyer-Meshkov, Shockwave Boundary Layer Interaction, Shock Propagation and Reflection, Shock Vortex Interaction, Shockwave Phenomena and Applications, as well as Medical and Biological Applications. The two Volumes contain the papers presented at the symposium and serve as a reference for the participants of the ISSW 28 and individuals interested in these fields.

Wave Propagation in Solids and Fluids - Julian L. Davis 2012-12-06
The purpose of this volume is to present a clear and systematic account of the mathematical methods of wave phenomena in solids, gases, and water that will be readily accessible to physicists and engineers. The emphasis is on developing the necessary mathematical techniques, and on showing how these mathematical concepts can be effective in unifying the physics of wave propagation in a variety of physical settings: sound and shock waves in gases, water waves, and stress waves in solids. Nonlinear effects and asymptotic phenomena will be discussed. Wave propagation in continuous media (solid, liquid, or gas) has as its foundation the three basic conservation laws of physics: conservation of mass, momentum, and energy, which will be described in various sections of the book in their proper physical setting. These conservation laws are expressed either in the Lagrangian or the Eulerian representation depending on whether the boundaries are relatively fixed or moving. In any case, these laws of physics allow us to derive the "field equations" which are expressed as systems of partial differential

equations. For wave propagation phenomena these equations are said to be "hyperbolic" and, in general, nonlinear in the sense of being "quasi linear" . We therefore attempt to determine the properties of a system of "quasi linear hyperbolic" partial differential equations which will allow us to calculate the displacement, velocity fields, etc.

Fundamental Concepts of Earthquake Engineering - Roberto Villaverde 2009-01-16

While successfully preventing earthquakes may still be beyond the capacity of modern engineering, the ability to mitigate damages with strong structural designs and other mitigation measures are well within the purview of science. Fundamental Concepts of Earthquake Engineering presents the concepts, procedures, and code provisions that are currentl

Stress Waves in Solids - Herbert Kolsky 1963-01-01

The most readable survey of the theoretical core of current knowledge available. The author gives a concise account of the classical theory necessary to an understanding of the subject and considers how this theory has been extended to solids.

Introduction to Impact Engineering - M. Macaulay 2012-12-06

We are all familiar with impact. Lesser impacts such as hammering a nail, cracking an egg or stubbing a toe are part of everyday life. More violent impacts such as those caused by car crashes or bullets are fortunately less common but are still well enough known to be taken for granted. Very violent impacts such as meteorites striking the earth are outside our personal experience but we are aware of them. Despite this, impacts remain mysterious. They occur too quickly for us to follow what is happening and the evidence they leave behind is often ambiguous. Over the last thirty years improvements in high speed instrumen tation and developments in computing have made them more comprehensible and an increasing amount of attention is being paid to the subject which is an area of expanding scientific and engineering research. A multi-disciplinary approach is not yet established and information is scattered in many places and expressed in a variety of jargons. In applied mathematics, impacts have provided interesting theoretical problems with elegant solutions but it has been difficult to check results experimentally. Impacts can change the behaviour of materials but similar changes can sometimes be produced in other ways and the underlying mechanisms are not clear. Empirical solutions to engineering problems have worked reasonably well but it is hard to know what to do if things go wrong.

Shock Compression of Condensed Matter - 1991 - S.C. Schmidt 2016-07-29

The papers collected together in this volume constitute a review of recent research on the response of condensed matter to dynamic high pressures and temperatures. Inlcuded are sections on equations of state, phase transitions, material properties, explosive behavior, measurement techniques, and optical and laser studies. Recent developments in this area such as studies of impact and penetration phenomenology, the development of materials, especially ceramics and molecular dynamics and Monte Carlo simulations are also covered. These latest advances, in addition to the many other results and topics covered by the authors, serve to make this volume the most authoritative source for the shock wave physics community.

Fracture Mechanics - George A. Papadopoulos 2012-12-06

Fracture and Mechanics is concerned with the experimental method of static and dynamic caustics and the Distribution of Determinant (Det.)-criterion of fracture. The Det.-criterion determines the conditions causing a crack and gives information on the expected angle of crack propagation. The object of this publication is to present the latest results to the re.earch and development community and to assist the teaching of experimental fracture mechanics and stress analysis in undergraduate and postgraduate courses. After discussing the basic theoretical considerations on the subject, experimental techniques and applications are introduced. Most of the results presented are based on the author's own investigations in the field of experimental mechanics since 1973 at the National Technical University of Athens.

Wave Motion in Elastic Solids - Karl F. Graff 2012-04-26

Self-contained coverage of topics ranging from elementary theory of

waves and vibrations in strings to three-dimensional theory of waves in thick plates. Over 100 problems.

The Kolsky-Hopkinson Bar Machine - Ramzi Othman 2018-04-20

In this book, leading scientists share their vision on the Kolsky-Hopkinson bar technique, which is a well-established experimental technique widely used to characterize materials and structures under dynamic, impact and explosion loads. Indeed, the Kolsky-Hopkinson bar machine is not a simple experimental device. It is rather a philosophical approach to solve the problem of measuring impact events. The split Hopkinson pressure bar conventional device is mainly limited to test homogeneous ductile non-soft materials under uni-axial compression. Extending the use of this device to more versatile applications faces several challenges such as controlling the stress state within the specimen and mastering the measurement of forces and velocities at the specimen-bar interfaces and then the material properties. Thus, the topics discussed in this book mainly focused on the loading and processing parts.

Nondestructive Evaluation - Don E. Bray 2018-10-03

Nondestructive evaluation (NDE) inspection schemes are important in design, manufacturing, and maintenance. By correctly applying techniques of NDE, we can reduce machine and system failures and increase reliability of operating systems over an extended lifetime. Nondestructive Evaluation: A Tool in Design, Manufacturing, and Service introduces and discusses primary techniques used in the field, including ultrasonics, acoustic emission, magnetics, radiography, penetrants, and eddy currents. Examples of each of these techniques are included, demonstrating typical applications.

Introduction to Petroleum Seismology, second edition - Luc T. Ikelle 2018-03-26

Introduction to Petroleum Seismology, second edition (SEG Investigations in Geophysics Series No. 12) provides the theoretical and practical foundation for tackling present and future challenges of petroleum seismology especially those related to seismic survey designs, seismic data acquisition, seismic and EM modeling, seismic imaging, microseismicity, and reservoir characterization and monitoring. All of the chapters from the first edition have been improved and/or expanded. In addition, twelve new chapters have been added. These new chapters expand topics which were only alluded to in the first edition: sparsity representation, sparsity and nonlinear optimization, near-simultaneous multiple-shooting acquisition and processing, nonuniform wavefield sampling, automated modeling, elastic-electromagnetic mathematical equivalences, and microseismicity in the context of hydraulic fracturing. Another major modification in this edition is that each chapter contains analytical problems as well as computational problems. These problems include MatLab codes, which may help readers improve their understanding of and intuition about these materials. The comprehensiveness of this book makes it a suitable text for undergraduate and graduate courses that target geophysicists and engineers as well as a guide and reference work for researchers and professionals in academia and in the petroleum industry.

Rock Fracture Mechanics - H.P. Rossmanith 2014-05-04

Light Water Reactor Safety Research Program - Dirk A. Dahlgren 1977

Progress in Smart Materials and Structures - Peter L. Reece 2007

"Smart" materials respond to environmental stimuli with particular changes in some variables. For that reason they are often also called responsive materials. Depending on changes in some external conditions, "smart" materials change either their properties (mechanical, electrical, appearance), their structure or composition, or their functions. Mostly, "smart" materials are embedded in systems whose inherent properties can be favourably changed to meet performance needs. Smart materials and structures have widespread applications in: 1. Materials science: composites, ceramics, processing science, interface science, sensor/actuator materials, chiral materials, conducting and chiral polymers, electrochromic materials, liquid crystals, molecular-level smart materials, biomaterials. 2. Sensing and actuation: electromagnetic, acoustic, chemical and mechanical sensing and actuation, single-

measurand sensors, multiplexed multimeasurand distributed sensors and actuators, sensor/actuator signal processing, compatibility of sensors and actuators with conventional and advanced materials, smart sensors for materials and composites processing. 3. Optics and electromagnetics: optical fibre technology, active and adaptive optical systems and components, tuneable high-dielectric phase shifters, tuneable surface control. 4. Structures: smart skins for drag and turbulence control, other applications in aerospace/hydrospace structures, civil infrastructures, transportation vehicles, manufacturing equipment, repairability and maintainability. 5. Control: structural acoustic control, distributed control, analogue and digital feedback control, real-time implementation, adaptive structure stability, damage implications for structural control. 6. Information processing: neural networks, data processing, data visualisation and reliability. This book presents leading research from around the globe in this field.

Mechanics of Metamaterials with Negative Parameters - Teik-Cheng Lim 2020-07-23

This book discusses bulk solids that derive their mechanical properties not from those of their base materials, but from their designed microstructures. Focusing on the negative mechanical properties, it addresses topics that reveal the counter-intuitive nature of solids, specifically the negativity of properties that are commonly positive, such as negative bulk modulus, negative compressibility, negative hygroexpansion, negative thermal expansion, negative stiffness phase, and negative Poisson’s ratio. These topics are significant not only due to the curiosity they have sparked, but also because of the possibility of designing materials and structures that can behave in ways that are not normally expected in conventional solids, and as such, of materials that can outperform solids and structures made from conventional materials. The book includes illustrations to facilitate learning, and, where appropriate, reference tables. The presentation is didactic, starting with simple cases, followed by increasingly complex ones. It provides a solid foundation for graduate students, and a valuable resource for practicing materials engineers seeking to develop novel materials through the judicious design of microstructures and their corresponding mechanisms.

Numerical Simulation in Applied Geophysics - Juan Enrique Santos 2017-01-13

This book presents the theory of waves propagation in a fluid-saturated porous medium (a Biot medium) and its application in Applied Geophysics. In particular, a derivation of absorbing boundary conditions in viscoelastic and poroelastic media is presented, which later is employed in the applications. The partial differential equations describing the propagation of waves in Biot media are solved using the Finite Element Method (FEM). Waves propagating in a Biot medium suffer attenuation and dispersion effects. In particular the fast compressional and shear waves are converted to slow diffusion-type waves at mesoscopic-scale heterogeneities (on the order of centimeters), effect usually occurring in the seismic range of frequencies. In some cases, a Biot medium presents a dense set of fractures oriented in preference directions. When the average distance between fractures is much smaller than the wavelengths of the travelling fast compressional and shear waves, the medium behaves as an effective viscoelastic and anisotropic medium at the macroscale. The book presents a procedure determine the coefficients of the effective medium employing a collection of time-harmonic compressibility and shear experiments, in the context of Numerical Rock Physics. Each experiment is associated with a boundary value problem, that is solved using the FEM. This approach offers an alternative to laboratory observations with the advantages that they are inexpensive, repeatable and essentially free from experimental errors. The different topics are followed by illustrative examples of application in Geophysical Exploration. In particular, the effects caused by mesoscopic-scale heterogeneities or the presence of aligned fractures are taking into account in the seismic wave propagation models at the macroscale. The numerical simulations of wave propagation are presented with sufficient detail as to be easily implemented assuming the knowledge of scientific programming techniques.

Armor - 1981

The magazine of mobile warfare.

On direct and inverse problems related to longitudinal impact of non-uniform elastic rods - Burgert, Jens 2021-05-07
The impact of two non-uniform elastic rods is considered and a recursive method was developed that solves the inverse problem: Find the location-dependent impedance function of the impacting rod that generates a prescribed impact force. The developed method delivers exact solutions in closed-form. Moreover, a condition is derived which states if a physically meaningful solution exists. Finally, the underlying 1D model has been validated experimentally.

Mechanics of Elastic Waves and Ultrasonic Nondestructive Evaluation - Tribikram Kundu 2019-07-09
Summary: This book presents necessary background knowledge on mechanics to understand and analyze elastic wave propagation in solids and fluids. This knowledge is necessary for elastic wave propagation modeling and for interpreting experimental data generated during ultrasonic nondestructive testing and evaluation (NDT&E). The book covers both linear and nonlinear analyses of ultrasonic NDT&E techniques. The materials presented here also include some exercise problems and solution manual. Therefore, this book can serve as a textbook or reference book for a graduate level course on elastic waves and/or ultrasonic nondestructive evaluation. It will be also useful for instructors who are interested in designing short courses on elastic wave propagation in solids or NDT&E. The materials covered in the first two chapters provide the fundamental knowledge on linear mechanics of deformable solids while Chapter 4 covers nonlinear mechanics. Thus, both linear and nonlinear ultrasonic techniques are covered here. Nonlinear ultrasonic techniques are becoming more popular in recent years for detecting very small defects and damages. However, this topic is hardly covered in currently available textbooks. Researchers mostly rely on published research papers and research monographs to learn about nonlinear ultrasonic techniques. Chapter 3 describes elastic wave propagation modeling techniques using DPSM. Chapter 5 is dedicated to an important and very active research field – acoustic source localization – that is essential for structural health monitoring and for localizing crack and other type of damage initiation regions. Features • Introduces Linear and Nonlinear ultrasonic techniques in a single book. • Commences with basic definitions of displacement, displacement gradient, traction and stress. • Provides step by step derivations of fundamental equations of mechanics as well as linear and nonlinear wave propagation analysis. • Discusses basic theory in addition to providing detailed NDE applications. • Provides extensive example and exercise problems along with an extensive solutions manual.

Dynamics of Smart Structures - Ranjan Vepa 2010-03-10
Dynamics of Smart Structures is a practical, concise and integrated text that provides an introduction to the fundamental principles of a field that has evolved over the recent years into an independent and identifiable subject area. Bringing together the concepts, techniques and systems associated with the dynamics and control of smart structures, it comprehensively reviews the differing smart materials that are employed in the development of the smart structures and covers several recent developments in the field of structural dynamics. Dynamics of Smart Structures has been developed to complement the author's new interdisciplinary programme of study at Queen Mary, University of London that includes courses on emerging and new technologies such as biomimetic robotics, smart composite structures, micro-electro-mechanical systems (MEMS) and their applications and prosthetic control systems. It includes chapters on smart materials and structures, transducers for smart structures, fundamentals of structural control, dynamics of continuous structures, dynamics of plates and plate-like structures, dynamics of piezoelectric media, mechanics of electro-actuated composite structures, dynamics of thermo-elastic media: shape memory alloys, and controller designs for flexible structures.

Journal of Research of the National Bureau of Standards - United States. National Bureau of Standards 1987

Rock Characterisation, Modelling and Engineering Design Methods - Xia-Ting Feng 2013-05-17
Rock Characterisation, Modelling and Engineering Design Methods

contains the contributions presented at the 3rd ISRM SINOROCK Symposium (Shanghai, China, 1820 June 2013). The papers contribute to the further development of the overall rock engineering design process through the sequential linkage of the three themes of rock characterisation, model

Ultrasonic and Electromagnetic NDE for Structure and Material Characterization - Tribikram Kundu 2016-04-19

Most books on nondestructive evaluation (NDE) focus either on the theoretical background or on advanced applications. Bridging the gap between the two, Ultrasonic and Electromagnetic NDE for Structure and Material Characterization: Engineering and Biomedical Applications brings together the principles, equations, and applications of ultrasonic and

The Shock and Vibration Bulletin - 1979

Shock Wave Compression of Condensed Matter - Jerry W Forbes 2013-02-01

This book introduces the core concepts of the shock wave physics of condensed matter, taking a continuum mechanics approach to examine liquids and isotropic solids. The text primarily focuses on one-dimensional uniaxial compression in order to show the key features of condensed matter's response to shock wave loading. The first four chapters are specifically designed to quickly familiarize physical scientists and engineers with how shock waves interact with other shock waves or material boundaries, as well as to allow readers to better understand shock wave literature, use basic data analysis techniques, and design simple 1-D shock wave experiments. This is achieved by first presenting the steady one-dimensional strain conservation laws using shock wave impedance matching, which insures conservation of mass, momentum and energy. Here, the initial emphasis is on the meaning of shock wave and mass velocities in a laboratory coordinate system. An overview of basic experimental techniques for measuring pressure, shock velocity, mass velocity, compression and internal energy of steady 1-D shock waves is then presented. In the second part of the book, more advanced topics are progressively introduced: thermodynamic surfaces are used to describe equilibrium flow behavior, first-order Maxwell solid models are used to describe time-dependent flow behavior, descriptions of detonation shock waves in ideal and non-ideal explosives are provided, and lastly, a select group of current issues in shock wave physics are discussed in the final chapter.

Condition Monitoring and Control for Intelligent Manufacturing - Lihui Wang 2006-08-02

Condition modelling and control is a technique used to enable decision-making in manufacturing processes of interest to researchers and practising engineering. Condition Monitoring and Control for Intelligent Manufacturing will be bought by researchers and graduate students in manufacturing and control and engineering, as well as practising engineers in industries such as automotive and packaging manufacturing.

Mechanics Today - S. Nemat-Nasser 2013-10-22

Mechanics Today, Volume 3 provides the advances in the fields of solid and fluid mechanics and applied mathematics. This volume is divided into six chapters that discuss the fundamentals and analytical and experimental results of dynamic behavior of linear and nonlinear systems. Chapter I provides a formulation of the effective stiffness theory with equations of motion and boundary conditions presented for the case of plain strain motion. Chapter II summarizes some of the analytical results that have been obtained in an effort to improve understanding of elastodynamic fracture processes. Chapter III presents the matrix difference equations used to formulate problems related to random vibration of periodic and almost periodic structures, taking advantage of the identical construction of the interconnecting units. Chapter IV describes a basic approach to the Oseen problem through the use of integral representations of the velocity and pressure fields. Chapter V deals with an analysis of nonlinear gyroscopic systems and the motions of high-order nongyroscopic systems. Chapter VI focuses on the application of the WKB perturbation method in the study of static deformation, vibration, wave propagation, and instability of elastic

bodies. This volume is of great value to solid and fluid mechanics specialists and also to non-specialists with sufficient background of the field.

Explosive Welding, Forming and Compaction - T.Z. Blazynski 2012-12-06

The last two decades have seen a steady and impressive development, and eventual industrial acceptance, of the high energy-rate manufact turing techniques based on the utilisation of energy available in an explo sive charge. Not only has it become economically viable to fabricate complex shapes and integrally bonded composites-which otherwise might not have been obtainable easily, if at all-but also a source of reasonably cheap energy and uniquely simple techniques, that often dispense with heavy equipment, have been made available to the engineer and applied scientist. The consolidation of theoretical knowledge and practical experience which we have witnessed in this area of activity in the last few years, combined with the growing industrial interest in the explosive forming, welding and compacting processes, makes it possible and also opportune to present, at this stage, an in-depth review of the state of the art. This book is a compendium of monographic contributions, each one of which represents a particular theoretical or industrial facet of the explosive operations. The contributions come from a number of practising engineers and scientists who seek to establish the present state of knowledge in the areas of the formation and propagation of shock and stress waves in metals, their metallurgical effects, and the methods of experimental assessment of these phenomena.