M Kachanov Theory Of Plasticity

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Pressure Vessel Design J. Ross Publishing
Presents a new physical and mathematical theory of irreversible deformations and ductile fracture of metals that acknowledges the continuous change in the structure of materials during deformation and the accumulation of deformation damage. Plastic deformation, viscous destruction, evolution of structure, creep processes, and long-term strength of metals and stress relaxation are described in the framework of a unified approach and model. The author then expands this into a mathematical model for determining the mechanical characteristics of quasi-samples of standard mechanical properties in deformed semi-finished products.
Micromechanics of Heterogeneous Materials Oxford University Press
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.
Mechanics of Solids and Materials Courier Corporation
Translation of hugely successful book aimed at advanced undergraduates, graduate students and researchers.
Finite Elements and Approximation Springer Science & Business Media
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.
Utilities Demonstration Series Cambridge University Press
William Hosford's book is ideal for those involved in designing sheet metal forming processes. Knowledge of plasticity is essential for the computer simulation of metal forming processes and understanding the advances in plasticity theory is key to formulating sound analyses. The author makes the subject simple by avoiding notations used by specialists in mechanics. R. Hill's authoritative book, Mathematical Theory of Plasticity (1950), presented a comprehensive treatment of continuum plasticity theory up to that time; much of the treatment in this book covers the same ground, but focuses on more practical topics. Hosford has included recent developments in continuum theory, including a newer treatment of anisotropy that has resulted from calculations of yielding based on crystallography, analysis of the role of defects, and forming limit diagrams. A much greater emphasis is placed on deformation mechanisms and the book also includes chapters on slip and dislocation theory and twinning.
Fundamentals of the Theory of Plasticity
This book is interdisciplinary in character and combines the knowledge of me chanics and chemical engineering with the aim of presenting a more exhaustive analysis ofthe phenomena occurring in wet materials during drying. Traditionally, the subject of drying has been an almost exclusive domain of chemical engineers. The drying curricula have mostly included only the courses of heat and mass transfer or diffusion. The mechanical phenomena that accompany drying, as for example, warping or deformation of dried materials, or the drying induced stresses and fissures of the material, were ignored or considered in a rather obscure way. This book broadens the scope of drying theory, bringing into the curriculum the tools enabling the study of both heat and mass transport processes and the me chanical phenomena that occur in wet materials under drying. There is little available literature that brings together heat and mass transport processes and mechanical phenomena in a unified approach to drying processes.
Deformation Theory of Plasticity CRC Press
This book derives from a 3 day intensive course on Pressure Vessel Design given regularly in the UK and around the world since 1986. It is written by experts in their field and although the main thrust of the Course has been directed to BS5500, the treatment of the material is of a general nature thus providing insight into other national standards.
Proceedings of the International Conference on Computational Methods for Predicting Material Processing Defects, September 8-11, 1987, Cachan, France Springer Science & Business Media
Containing case studies and examples, the book aims to cover extensive research particularly on surface stress and topics related to the variational approach to the subject, and non-standard topics such as the rigorous treatment of constraints and a full discussion of algebraic inequalities associated with realistic material behaviour, and their implications. Serving as an introduction to the basic elements of Finite Elasticity, this textbook is the cornerstone for any graduate-level on the topic, while also providing a template for a host of theories in Solid Mechanics.
An Engineering Approach and a Practical Guide American Mathematical Soc.
The study of Riemann problems has undergone a strong, steady growth in the last decade. The general direction of the research has headed toward understanding the wave structure of the solutions of more physically realistic systems. These systems fail either or both of the two main restrictions of the classical theory - that the system be strictly hyperbolic or genuinely nonlinear. The systems that have been studied tend to fall into the following broad classes: real gas dynamics (including combustion), visco-elastic materials, phase transitions, and multiphase flow in porous media. In addition to their usefulness in large-scale calculations, computational schemes have vastly improved the handling of discontinuity behavior.This volume contains the proceedings of the AMS-IMS-SIAM Joint Summer Research Conference on Current Progress in Hyperbolic Systems: Riemann Problems and Computations, held at Bowdoin College in July 1988. The papers presented here provide a complete picture of recent research by some of the leaders in this field. Graduate students and beginning researchers will find this book a useful introduction to current work in this area.
Basic Geometrically Linear Models in 1D Springer Science & Business Media
This book develops methods to simulate and analyze the time-dependent changes of stress and strain states in engineering structures up to the critical stage of creep rupture. The objective of this book is to review some of the classical and recently proposed approaches to the modeling of creep for structural analysis applications. It also aims to extend the collection of available solutions of creep problems by new, more sophisticated examples.
Encyclopedia of physics Bull Ridge Corporation
This volume is written by Academician Sedov who is considered by many as the leading scientist in mechanics in the USSR. This latest fourth edition helps the reader in a relatively short time to master and acquire fully the essence of many geometrical and mechanical theories. Contents: Volume 1:Kinematics of a Deformable MediumDynamic Concepts and Dynamic Equations of Continuum MechanicsThe Closed Systems of Mechanical Equations for the Simplest Models of Continuous Media. Some Results from Tensor AnalysisBasic Thermodynamic Concepts and EquationsBasic Concepts and Equations of ElectrodynamicsOn the

Formulation of Problems in Continuum MechanicsNonlinear Tensor Functions of Several Tensor ArgumentsModels of Continuous Media with Internal Degrees of FreedomVolume 2:HydrodynamicsTheory of ElasticityTheory of PlasticityIntroduction to the Plane Problems of the Theory of Elasticity and the Theory of Cracks Readership: Scientists/researchers of mechanical engineering, applied physics and theoretical physicists.

The Catalogue of Computational Material Models Courier Corporation

The scientists of the seventeenth and eighteenth centuries, led by Jas. Bernoulli and Euler, created a coherent theory of the mechanics of strings and rods undergoing planar deformations. They introduced the basic con cepts of strain, both extensional and flexural, of contact force with its com ponents of tension and shear force, and of contact couple. They extended Newton's Law of Motion for a mass point to a law valid for any deformable body. Euler formulated its independent and much subtler complement, the Angular Momentum Principle. (Euler also gave effective variational characterizations of the governing equations.) These scientists breathed life into the theory by proposing, formulating, and solving the problems of the suspension bridge, the catenary, the velaria, the elastica, and the small transverse vibrations of an elastic string. (The level of difficulty of some of these problems is such that even today their descriptions are sel dom vouchsafed to undergraduates. The realization that such profound and beautiful results could be deduced by mathematical reasoning from fundamental physical principles furnished a significant contribution to the intellectual climate of the Age of Reason.) At first, those who solved these problems did not distinguish between linear and nonlinear equations, and so were not intimidated by the latter. By the middle of the nineteenth century, Cauchy had constructed the basic framework of three-dimensional continuum mechanics on the founda tions built by his eighteenth-century predecessors.

Mechanics of Deformable Solids CRC Press

Variational methods are applied to prove the existence of weak solutions for boundary value problems from the deformation theory of plasticity as well as for the slow, steady state flow of generalized Newtonian fluids including the Bingham and Prandtl-Eyring model. For perfect plasticity the role of the stress tensor is emphasized by studying the dual variational problem in appropriate function spaces. The main results describe the analytic properties of weak solutions, e.g. differentiability of velocity fields and continuity of stresses. The monograph addresses researchers and graduate students interested in applications of variational and PDE methods in the mechanics of solids and fluids.

Transport Phenomena in Porous Media Springer Science & Business Media

Classical plasticity theory of metals is independent of the hydrostatic pressure. However if the metal contains voids or pores or if the structure is composed of cells, this classical assumption is no more valid and the influence of the hydrostatic pressure must be incorporated in the constitutive description. Looking at the microlevel, metal plasticity is connected with the uniform planes of atoms organized with long-range order. Planes may slip past each other along their close-packed directions. The result is a permanent change of shape within the crystal and plastic deformation. The presence of dislocations increases the likelihood of planes slipping. Nowadays, the theory of pressure sensitive plasticity is successfully applied to many other important classes of materials (polymers, concrete, bones etc.) even if the phenomena on the micro-level are different to classical plasticity of metals. The theoretical background of this phenomenological approach based on observations on the macro-level is described in detail in this monograph and applied to a wide range of different important materials in the last part of this book.

Nonlinear Problems of Elasticity Cambridge University Press

The papers in this book deal with computational methods for predicting material processing defects. Using recent advances in finite strain plasticity and viscoplasticity, damage modelling, bifurcation and instability theory, fracture mechanics and computer numerical techniques, new approaches to mechanical defect analysis are proposed. Appropriate methods for explaining and avoiding the defects leading to fracture, high porosity, strain localization or undesirable geometrical imperfections are presented. In addition, some papers are devoted to new formulations and new calculation algorithms to be used for solving the forming problems. Finally, two papers deal with physical description of defects occurring in forming and cutting operations, focusing on the academic and practical interest of these topics. This is the first book to deal with the prediction of defects occurring in material forming processes; it contains much of interest from both a theoretical and a practical viewpoint.

Introduction to the Variational Formulation in Mechanics Springer Nature

From the reviews: "In striving toward the encyclopedic, Haupt employs a full arsenal of geometric tools, from curvilinear coordinates to several different strain tensors for both the spatial and material formulations. The emphasis throughout is on the mechanics of solids." SIAM Review

Continuum Mechanics and Theory of Materials Springer Nature

Here is an accurate and timely account of micromechanics, which spans materials science, mechanical engineering, applied mathematics, technical physics, geophysics, and biology. The book features rigorous and unified theoretical methods of applied mathematics and statistical physics in the material science of microheterogeneous media. Uniquely, it offers a useful demonstration of the systematic and fundamental research of the microstructure of the wide class of heterogeneous materials of natural and synthetic nature.

Foundations of the Theory of Plasticity North-Holland

This book gives a comprehensive account of the formulation and computational treatment of basic geometrically linear models in 1D. To set the stage, it assembles some preliminaries regarding necessary modelling, computational and mathematical tools. Thereafter, the remaining parts are concerned with the actual catalogue of computational material models. To this end, after starting out with elasticity as a reference, further 15 different basic variants of material models (5 x each of {visco-elasticity, plasticity, visco-plasticity}, respectively) are systematically explored. The presentation for each of these basic material models is a stand-alone account and follows in each case the same structure. On the one hand, this allows, in the true sense of a catalogue, to consult each of the basic material models separately without the need to refer to other basic material models. On the other hand, even though this somewhat repetitious concept may seem tedious, it allows to compare the formulation and resulting algorithmic setting of the various basic material models and thereby to uncover, in detail, similarities and differences. In particular, the response of each basic material model is analysed for the identical histories (Zig-Zag, Sine, Ramp) of prescribed strain and stress so as to clearly showcase and to contrast to each other the characteristics of the various modelling options.

Current Progress in Hyperbolic Systems: Riemann Problems and Computations John Wiley & Sons

J. Ross Publishing Classics are world-renowned texts and monographs written by preeminent scholars. These books are suitable for students, researchers, professionals and libraries.

Fundamentals of Engineering Plasticity Springer Science & Business Media

An area at the intersection of solid mechanics, materials science, and stochastic mathematics, mechanics of materials often necessitates a stochastic approach to grasp the effects of spatial randomness. Using this approach, Microstructural Randomness and Scaling in Mechanics of Materials explores numerous stochastic models and methods used in the mechanics of random media and illustrates these in a variety of applications. The book first offers a refresher in several tools used in stochastic mechanics, followed by two chapters that outline periodic and disordered planar lattice (spring) networks. Subsequent chapters discuss stress invariance in classical planar and micropolar elasticity and cover several topics not yet collected in book form, including the passage of a microstructure to an effective micropolar continuum. After forming this foundation in various methods of stochastic mechanics, the book focuses on problems of microstructural randomness and scaling. It examines both representative and statistical volume elements (RVEs/SVEs) as well as micromechanically based stochastic finite elements (SFEs). The author also studies nonlinear elastic and inelastic materials, the stochastic formulation of thermomechanics with internal variables, and wave propagation in random media. The concepts discussed in this comprehensive book can be applied to many situations, from micro and nanoelectromechanical systems (MEMS/NEMS) to geophysics.