

Koichi Hashiguchi

Elastoplasticity Theory

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Koichi Hashiguchi, Yuki Yamakawa



Elastoplasticity Theory:

Elastoplasticity Theory Vlado A. Lubarda, 2001-07-16 Understanding the elastoplastic deformation of metals and geomaterials including the constitutive description of the materials and analysis of structure undergoing plastic deformation is an essential part of the background required by mechanical civil and geotechnical engineers as well as materials scientists However most books address the su

Elastoplasticity Theory Koichi Hashiguchi, 2013-07-16 This book was written to serve as the standard textbook of elastoplasticity for students engineers and researchers in the field of applied mechanics The present second edition is improved thoroughly from the first edition by selecting the standard theories from various formulations and models which are required to study the essentials of elastoplasticity steadily and effectively and will remain universally in the history of elastoplasticity It opens with an explanation of vector tensor analysis and continuum mechanics as a foundation to study elastoplasticity theory extending over various strain and stress tensors and their rates Subsequently constitutive equations of elastoplastic and viscoplastic deformations for monotonic cyclic and non proportional loading behavior in a general rate and their applications to metals and soils are described in detail and constitutive equations of friction behavior between solids and its application to the prediction of stick slip phenomena are delineated In addition the return mapping algorithm the consistent tangent operators and the objective time integration algorithm of rate tensor are explained in order to enforce the FEM analyses All the derivation processes and formulations of equations are described in detail without an abbreviation throughout the book The distinguishable features and importance of this book is the comprehensive description of fundamental concepts and formulations including the objectivity of tensor and constitutive equations the objective time derivative of tensor functions the associated flow rule the loading criterion the continuity and smoothness conditions and their substantial physical interpretations in addition to the wide classes of reversible irreversible constitutive equations of solids and friction behavior between solids

Foundations of Elastoplasticity: Subloading Surface Model Koichi Hashiguchi, 2023-06-12 This book is the standard text book for elastoplasticity viscoplasticity which is explained comprehensively covering the rate independent to dependent finite deformations of metals soils polymers crystal plasticity etc and the friction phenomenon Concise explanations on vector tensor analysis and continuum mechanics are provided first covering the underlying physical concepts e g various time derivatives pull back and push forward operations work conjugacy and multiplicative decomposition of deformation gradient tensor Then the rigorous elastoplastic viscoplastic model called the subloading surface model is explained comprehensively which is based on the subloading surface concept to describe the continuous development of the plastic viscoplastic strain rate as the stress approaches to the yield surface while it can never be described by the other plasticity models e g the Chaboche Ohno and the Dafalias Yoshida models assuming the purely elastic domain The main features of the subloading surface model are as follows 1 The subloading surface concept underling the cyclic plasticity is introduced which insists that the plastic deformation develops as the stress approaches the yield

surface Thus the smooth elastic plastic transition leading to the continuous variation of the tangent stiffness modulus is described always 2 The subloading overstress model is formulated by which the elastoplastic deformation during the quasi static loading and the viscoplastic deformation during the dynamic and impact loading can be described by the unified equation Then only this model can be used to describe the deformation in the general rate of deformation disusing the elastoplastic constitutive equation 3 The hyperelastic based visco plasticity based on the multiplicative decomposition of deformation gradient tensor and the subloading surface model is formulated for the exact descriptions of the finite elastic and visco plastic deformations 4 The subloading friction model is formulated for the exact description of the dry and the fluid lubricated frictions at the general rate of sliding from the static to the impact sliding Thus all the elastic and inelastic deformation sliding phenomena of solids can be described accurately in the unified equation by the subloading overstress model The subloading surface model will be engraved as the governing law of irreversible deformation of solids in the history of solid mechanics

Elastoplasticity Theory Vlado A. Lubarda,2001-07-16 Understanding the elastoplastic deformation of metals and geomaterials including the constitutive description of the materials and analysis of structure undergoing plastic deformation is an essential part of the background required by mechanical civil and geotechnical engineers as well as materials scientists However most books address the su

Introduction to Finite Strain Theory for Continuum Elasto-Plasticity Koichi Hashiguchi,Yuki Yamakawa,2012-10-09 Comprehensive introduction to finite elastoplasticity addressing various analytical and numerical analyses including state of the art theories Introduction to Finite Elastoplasticity presents introductory explanations that can be readily understood by readers with only a basic knowledge of elastoplasticity showing physical backgrounds of concepts in detail and derivation processes of almost all equations The authors address various analytical and numerical finite strain analyses including new theories developed in recent years and explain fundamentals including the push forward and pull back operations and the Lie derivatives of tensors As a foundation to finite strain theory the authors begin by addressing the advanced mathematical and physical properties of continuum mechanics They progress to explain a finite elastoplastic constitutive model discuss numerical issues on stress computation implement the numerical algorithms for stress computation into large deformation finite element analysis and illustrate several numerical examples of boundary value problems Programs for the stress computation of finite elastoplastic models explained in this book are included in an appendix and the code can be downloaded from an accompanying website

Theory of Nuclear Structure and Reactions Manuel Lozano,Gonzalo Madurga,1985 [Constitutive Laws for Engineering Materials ; Theory and Application](#) Chandrakant S. Desai,Richard H. Gallagher,1983 **Advances in Engineering Plasticity and Its Applications** W.P. Shen,Jin Quan Xu,2004-10-15 Proceedings of the 7th Asia Pacific Symposium on Engineering Plasticity and Its Applications AEPA 2004 22 26 September 2004 Shanghai China P R **Elements of Plasticity** I. St Doltsinis,2010 Providing the essential theoretical framework for understanding elastoplastic behaviour this text develops the subject of

small strain elastoplasticity from classical theory to modern computational techniques *Bounding Surface Elastoplasticity-viscoplasticity for Clays* Victor Nicholas Kaliakin,1985 **Prediction, Analysis and Design in Geomechanical Applications** Giovanni B. Barla,Marco Barla,2005 Finite Inelastic Deformations — Theory and Applications International Union of Theoretical and Applied Mechanics,1992-11-27 Very Good No Highlights or Markup all pages are intact **Computational Fluid and Solid Mechanics 2005** Klaus-Jürgen Bathe,2005 The MIT Conferences in Computational Fluid and Solid Mechanics are now established as the premier meeting place for industry and academia to come together and share ideas Distinguished and thought provoking keynote lectures cutting edge research results and directions for future research are presented in over 600 contributions The CD Rom version enables specialized searching across complete contents Contributing authors present results which address eight fundamental areas for research and development The automatic solution of mathematical models Effective numerical schemes for fluid flows The development of an effective mesh free numerical solution method The development of numerical procedures for multiphysics problems The development of numerical procedures for multiscale problems The modelling of uncertainties The analysis of complete life cycles of systems Education teaching sound engineering and scientific judgement *Modern Design Technologies and Experiment for Advanced Manufacture and Industry* Chien Hung Liu,2015-05-28 Selected paper from the 3rd International Conference on Engineering and Technology Innovation held in Kenting Pingtung Taiwan R O C October 31 November 4 2014 *Stress Analysis Applications* C. A. Brebbia,Wolfgang L. Wendland,G. Kuhn,1987-09 **Geotechnical abstracts** ,1984 **The Finite Element Method for Three-Dimensional Thermomechanical Applications** Guido Dhondt,2004 1 Displacements strain stress and energy 2 Linear mechanical applications 3 Geometric nonlinear effects 4 Hyperelastic materials 5 Infinitesimal strain plasticity 6 Finite strain elastoplasticity 7 Heat transfer **Geomaterials** ,1999 **Physics Briefs** ,1987 **Proceedings of the ... Southeast Asian Geotechnical Conference** ,1987

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