

LEIF N. PERSEN

ROCK DYNAMICS

AND GEOPHYSICAL EXPLORATION

DEVELOPMENTS IN GEOTECHNICAL ENGINEERING VOL. 8

Rock Dynamics Geophysical Exploration

Tao Wei



Rock Dynamics Geophysical Exploration:

Rock Dynamics and Geophysical Exploration Leif N. Persen, 1975

Rock Dynamics and Geophysical Exploration

L.N. Persen, 2015-12-04 *Rock Dynamics and Geophysical Exploration* Introduction to Stress Waves in Rocks deals with a theoretical tool for predicting stress waves in rocks. The book considers both elastic and Kelvin type materials and also explains some experiments of stress waves in rocks. The book reviews concepts in the analysis of stresses and deformations, the fundamental equations used to examine the propagation of stress waves in certain types of solids and the characteristics features of plane waves in elastic mediums. The text explains wave propagation in rocks due to a detonating charge resulting in stress waves with a spherical symmetry, the response of a cylinder to an outside excitation resulting in a cylindrical wave or a harmonically oscillating stress from an outside excitation resulting in a harmonic input pulse. The text explains Kelvin materials as a generalization of the behavior of the material where a damping effect is incorporated with the elastic medium being studied. The book also compares experimental results of the application of stress waves in rocks with theory and explains the sensitivity criteria for tunnels. The text cites as an example the significance of the interaction between tunnels and shock waves before any tunnel expansion can be made by engineers. The book will prove valuable for geologists or for structural civil and mining engineers.

AI for Rock Dynamics Manchao He, LiGe Wang, Wei Yao, Wengang Dang, Zhuo

Wang, 2025-07-18 This Open Access book covers various aspects in rock dynamics comprehensively such as theoretical foundations, testing techniques, dynamic properties, stress wave propagation, rockburst dynamics, numerical simulation and engineering applications. *AI for Rock Dynamics* is a groundbreaking Open Access monograph that redefines publishing through Luffa AI, a China developed large language model LLM. Set to captivate at the London Book Fair 2025, it marks a transformative milestone in rock mechanics and beyond. Covering theoretical foundations, testing instruments, numerical simulation and engineering applications, it is an essential resource for professionals in civil engineering, mining and geology alike. Its clear presentation, illustrations and practical insights make it pivotal for tackling rock mechanics challenges. Unique for its homegrown LLM, it showcases Chinese AI's potential to advance research. As China's first LLM powered book, it revolutionizes knowledge production, organization and dissemination. This landmark was achieved through a strategic partnership between CNPIEC, Kexin Technology, CSRME and Springer Nature, unprecedentedly integrating cutting edge technology, academic expertise and global publishing prominence. Published as Open Access, it democratizes knowledge, fostering collaboration and innovation. The first of its kind signifies AI's potential to transform publishing, streamlining content creation and enhancing dissemination. *AI for Rock Dynamics* is a beacon of progress uniting technology and academia to push knowledge boundaries with concerted efforts. Please Join us in celebrating this historic achievement and witness the dawn of AI powered publishing.

Rock Dynamics Omer Aydan, 2017-05-30

Rock dynamics has become one of the most important topics in the field of rock mechanics and rock engineering. The spectrum of rock dynamics is very wide and it

includes the failure of rocks rock masses and rock engineering structures such as rockbursting spalling popping collapse toppling sliding blasting non destructive testing geophysical explorations science and engineering of rocks and impacts The book specifically covers fundamentals of rock dynamics constitutive models numerical analysis techniques dynamic testing procedures the multi parameter responses and motions of rocks during fracturing or slippage in laboratory experiments earthquakes and their strong motion characteristics and their effect on various rock structures such as foundations underground structures slopes dynamic simulation of loading and excavation blasting and its positive utilization in rock engineering the phenomenon of rockburst in rock excavations non destructive testing of rockbolts and rock anchors and impacts by meteors or projectiles The main goal of this book is to present a unified and complete treatise on Rock Dynamics and to represent a milestone in advancing the knowledge in this field and in leading to new techniques for experiments analytical and numerical modelling as well as monitoring of dynamics of rocks and rock engineering structures **Dynamic**

Soil-Structure Interaction C. Zhang, John P Wolf, 1998-09-22 Dynamic Soil structure interaction is one of the major topics in earthquake engineering and soil dynamics since it is closely related to the safety evaluation of many important engineering projects such as nuclear power plants to resist earthquakes In dealing with the analysis of dynamic soil structure interactions one of the most difficult tasks is the modeling of unbounded media To solve this problem many numerical methods and techniques have been developed This book summarizes the most recent developments and applications in the field of dynamic soil structure interaction both in China and Switzerland An excellent book for scientists and engineers in civil engineering structural engineering geotechnical engineering and earthquake engineering **Rock Mechanics on a**

Geological Base R. Pusch, 1995-04-07 Until a few years ago hydropower road tunneling and mining were the main fields interested in rock mechanics Now however rock mechanics is becoming increasingly important in many more branches the most significant globally being the disposal of hazardous especially radioactive waste in deeply located repositories This has raised a number of new aspects on the mechanical behaviour of large rock masses hosting repositories and of smaller rock elements forming the nearfield of tunnels and boreholes with waste containers The geological background and above all rock structure form the basis of this book The structural scheme proposed is referred to explain the scale dependent behaviour of rock Thus the reason for differences in strength and strain properties of different types and volumes of rocks is shown in a very clear fashion using simple material models and very basic numerical models The author's academic background in both geology and soil and rock mechanics and his long experience in practical design and construction work has led to an unusually pedagogic way of dealing with the subject The book is intended for use by consultants in engineering geology and waste disposal and by students of these subjects However engineers and geologists with a limited background in stress strain and fracture theory and computer based calculation methods will also find the book attractive **Slope Analysis** R

Chowdury, 2012-12-02 Slope Analysis summarizes the fundamental principles of slope analysis It explores not only the

similarities but also the differences in rock slopes and soil slopes and it presents alternative methods of analysis new concepts and new approaches to analysis The book introduces both natural and man made slopes the nature of soils and rocks geomorphology geology and the aims of slope analysis These topics are followed by chapters about stress and strain shear strength of rock and soils and progressive failure of slopes This book also presents limit equilibrium methods I and II which are the planar failure surfaces and slip surfaces of arbitrary shape respectively It also includes stress analysis and slope stability natural slope analysis and a brief review on plasticity and shear band analysis Before presenting its conclusions the book discusses special aspects of slope analysis such as earthquake analysis pseudo static analysis dynamic analysis and anisotropy in addition to Newmark s approach

Rockfill in Hydraulic Engineering D.J.

Stephenson,1979-01-01 Rockfill in Hydraulic Engineering Ground Freezing Hans L. Jessberger,2012-12-02 Developments in Geotechnical Engineering Volume 26 Ground Freezing presents the proceedings of the First International Symposium on Ground Freezing held in Bochum Germany on March 8 10 1978 It summarizes progress in the application of the ground freezing technique in geotechnical engineering with a focus on engineering with frozen soils and related frost research problems It includes papers that discuss phase transformation of water thermodynamics heat and mass transfer and mathematical models The laboratory and theoretical studies of thermophysical and mechanical properties are discussed as well Organized into 43 chapters this volume begins with an overview of the freezing and thawing of soils earth and rock and the engineering applications of the favorable properties of frozen ground It then discusses the mechanical properties of artificially frozen soil for construction purposes the principles of mechanical and thermal behavior of frozen soil and the design and calculation of frozen soil structures Furthermore it explains the calculation and dimensioning of refrigeration plants and monitoring of frost penetration The methods and instrumentation for determining the locations of boundaries of frozen soils and the factors affecting the formation of soil cryogenic textures upon artificial active and passive soil freezing are described The book also details the influence of salts in the pore water in freezing soils and explains how clay microstructure affects the amount of unfrozen water In addition it presents the physicommechanical and thermomechanical properties of frozen coarse grained soil with sandy clay aggregate This book will be a valuable source of information for scientists and engineers

Stress in Subsoil and Methods of Final Settlement Calculation J. Feda,2013-10-22

Developments in Geotechnical Engineering Volume 18 Stress in Subsoil and Methods of Final Settlement Calculation reviews the method of settlement calculations based on stresses in the subsoil This book is divided into three chapters Chapter 1 deals with in situ stresses in the subsoil while Chapter 2 focuses on the state of stress produced in the subsoil by external loads The last chapter discusses the methods of calculating the final settlement including remarks on the selection of deformation parameters This publication also discusses the horizontal geostatic stress surface loading of a half space method of oedometric compression and finite element and allied methods This volume is recommended for researchers and

specialists of disciplines related to geotechnical engineering **Ground Freezing 1980** P.E. Frivik,N. Janbu,R. Saetersdal,L.I. Finborud,2017-01-31 These papers cover mechanical properties and processes thermal properties processes and design frost action in soils and design and case histories Canal and River Levées P. Peter,2014-04-25 Canal and River Lev es covers the fundamental principles of canal embankments and lev es calculation and design Canal embankments and lev es are amongst the world s oldest hydroengineering structures This book is divided into seven chapters that focus on solving the problems of protecting control levees which sometimes called anti flood or anti inundation dykes The opening chapter surveys the general problems of dam design and construction The next chapters deal with the basic characteristics determination experimental methods and calculations of seepage as well as the stability calculations and embankment settlement These topics are followed by discussions of the local conditions and demands relating to the construction of embankments and their various concrete structures Other chapters explore the requirements of power and irrigation canal sealing and the subsoil protection of levees The last chapter looks into the measurements general requirements and observation of dams and levees This book is intended primarily for civil engineering designers *The Bearing Capacity of Building Foundations* A. Myslivec,Z. Kysela,2014-08-28 The Bearing Capacity of Building Foundations describes the different ways of ultimate bearing capacity determination of building foundations This four chapter book considers the effect of a horizontal force acting on a foundation It also examines a situation where beneath the foundation level in the zone of influence of the foundation there are two layers of soil including the case where the second lower layer is formed by incompressible rock A chapter explores the case where the subgrade consists of a number of heterogeneous strata of soil The remaining chapters deal with the determination of the permissible load of a foundation and the safety factor and also the contact stress in the foundation line since this has a great influence on the dimensioning of foundation slabs This book will prove useful to practicing civil engineers **Elastic Analysis of Soil-Foundation Interaction** A.P.S. Selvadurai,2013-10-22 Developments in Geotechnical Engineering Vol 17 Elastic Analysis of Soil Foundation Interaction focuses on the analysis of the interaction between structural foundations and supporting soil media The publication first elaborates on soil foundation interaction problems idealized soil response models for the analysis of soil foundation interaction and plane strain analysis of an infinite plate and an infinitely long beam Discussions focus on three dimensional effects in the infinite beam problem elastic models of soil behavior foundation and interface behavior and elastic plastic and time dependent behavior of soil masses The manuscript then ponders on the analysis of beams of finite length axisymmetric three dimensional problem of an infinite plate and analysis of finite plates Concerns cover axisymmetric loading of a circular plate analysis of rectangular plates axisymmetric three dimensional problem of the infinite plate modifications of the thin plate theory finite beams on a two parameter elastic medium and finite beams on an elastic solid medium The book tackles the determination of soil parameters experimental investigations and field studies as well as experimental investigations and

field studies and measurement and interpretation of parameters encountered in the idealized soil models in relation to soil foundation behavior The publication is a valuable reference for researchers interested in the elastic analysis of soil foundation interaction *Seismic Risk and Engineering Decisions* Cinna Lomnitz, 2012-12-02 *Seismic Risk and Engineering Decisions* attempts to bridge the gap in decision making between earthquake characteristics and structural behavior The book begins by providing the background on earthquake generation and characteristics It reviews the present state of matters in seismicity assessment and treats uncertainties explicitly The impact of earthquakes on large bodies of water and structures is also discussed These discussions set the stage for the final part of the book which deals with the principles and implications of seismic design decision analysis The book also delves into the selection of instruments for seismological research and engineering applications with emphasis on widely used conventional seismological equipment This book is intended to help experienced consulting engineers in assessing seismic risk and making rational decisions when locating and designing important engineering works and when drafting building codes and land use regulations It will also provide advanced students of engineering with bases for benefiting from his future experience Engineering Geology Q Zaruba, 2012-12-02 *Engineering Geology* attempts to provide an understanding of relations between the geology of a building site and the engineering structure It presents examples taken from real life experience and practice to provide evidence for the significance of engineering geology in planning design construction and maintenance of engineering structures The book begins with an introduction of geological investigations distinguishing between the reconnaissance investigation the detailed investigation and investigation during construction It then explains the significance of geological maps and sections the mechanical behavior of rocks subsurface investigation for engineering construction and geophysical methods The remaining chapters discuss the physical and chemical weathering of rocks slope movements and geological investigations for buildings roads and railways tunnels and hydraulic structures This book is intended particularly for civil engineering students and students of engineering geology in the university faculties of natural sciences It describes geological features so as to be comprehensible to Technical College students and to explain construction problems intelligibly for geology students The book will also be of assistance to planners civil engineers and graduate engineering geologists *Natural Phenomena* , 2012-12-02 *Developments in Geotechnical Engineering Vol 14A Rockslides and Avalanches 1* *Natural Phenomena* focuses on attempts to provide a foundation for studies of mass movement phenomena in the Western Hemisphere The selection first elaborates on Albert Heim s observations on landslides and relevance to modern interpretations Frank rockslide in Alberta Canada and Lower Gros Ventre slide in Wyoming U S A Discussions focus on geologic environment events triggered by rise and fall of slide lake level description of slide mass and zone of detachment stability analysis travel distance of sturzstrom deposits and geometry of the Elm sturzstrom deposits The publication then takes a look at Madison Canyon rockslide in Montana U S A Little Tahoma Peak rockfalls and avalanches in Mount Rainier Washington U S A Sherman Glacier rock

avalanche in Alaska U S A and Nevados Huascaran avalanches in Peru Topics include rockslide kinematics associated seismic activity meteorological and hydrological conditions mode of emplacement of other Alaskan rock avalanches and applicability of mechanical fluidization to other rock avalanches The text examines the mechanics of glacier movement dynamics of snow avalanches failure of snow slopes and role of gravity in plate tectonics The selection is a valuable reference for researchers wanting to study further rockslides and avalanches

Engineering Sites, 2013-10-22 Developments in Geotechnical Engineering Vol 14B Rockslides and Avalanches 2 Engineering Sites focuses on initiatives to offer a foundation for studies of mass movement phenomena in the Western Hemisphere The selection first takes a look at the contributions of Josef Stini to engineering geology and slope movement investigations the concept of Karl Terzaghi on rockslides and the contributions of Laurits Bjerrum to the mechanics of rockslides Concerns cover stability of hard rock slopes influence of geological details relation between slide process and remedial treatment water pressure in pores and fractures slope creep rockslides and avalanches and early warning of an impending slide The publication then examines rock slope movements with hydroelectric power projects in Mexico Bighorn Reservoir slides in Montana U S A rock avalanche and wave at Chungar Peru and wedge rockslides in Libby Dam and Lake Koocanusa in Montana The text examines Hogarth Pit slope failure in Ontario Canada pit slope performance in shale in Wyoming U S A Twin Buttes pit slope failure in Arizona U S A and the Prime Mine slope failure in Arizona U S A Discussions focus on stability analyses description of slope failures cause of failure remedial actions geotechnical properties of tertiary shales and subsequent slope performance The selection is a valuable source of data for researchers interested in rockslides and avalanches

Selected Library Acquisitions United States. Department of Transportation, Fundamentals of Discrete Element Methods for Rock Engineering: Theory and Applications Lanru Jing, Ove Stephansson, 2007-07-18 This book presents some fundamental concepts behind the basic theories and tools of discrete element methods DEM its historical development and its wide scope of applications in geology geophysics and rock engineering Unlike almost all books available on the general subject of DEM this book includes coverage of both explicit and implicit DEM approaches namely the Distinct Element Methods and Discontinuous Deformation Analysis DDA for both rigid and deformable blocks and particle systems and also the Discrete Fracture Network DFN approach for fluid flow and solute transport simulations The latter is actually also a discrete approach of importance for rock mechanics and rock engineering In addition brief introductions to some alternative approaches are also provided such as percolation theory and Cosserat micromechanics equivalence to particle systems which often appear hand in hand with the DEM in the literature Fundamentals of the particle mechanics approach using DEM for granular media is also presented Presents the fundamental concepts of the discrete models for fractured rocks including constitutive models of rock fractures and rock masses for stress deformation and fluid flow Provides a comprehensive presentation on discrete element methods including distinct elements discontinuous deformation analysis discrete fracture networks particle mechanics and Cosserat representation of granular

media Features constitutive models of rock fractures and fracture system characterization methods detailing their significant impacts on the performance and uncertainty of the DEM models

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