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Bifurcations, Instabilities, Degradation in Geomechanics

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Bifurcations Instabilities Degradation In Geomechanics

**Richard Wan, Mustafa Alsaleh, Joe
Labuz**



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Bifurcations, Instabilities, Degradation in Geomechanics George Exadaktylos, Ioannis G. Vardoulakis, 2007-04-27 This is an up to date review of developments in the field of bifurcations and instabilities in geomechanics from some of the world's leading experts. Leading international researchers and practitioners of the topics debate the developments and applications which have occurred over the last few decades. Beside fundamental research findings, applications in geotechnical, petroleum, mining and bulk materials engineering are emphasised.

Bifurcations, Instabilities and Degradations in Geomaterials Richard Wan, Mustafa Alsaleh, Joe Labuz, 2011-03-16 Geomaterials exhibit complex but rich mechanical behaviour with a variety of failure modes ranging from diffuse to localized deformation depending on stress, density, microstructure and loading conditions. These failure modes are a result of an instability of material and/or geometric nature that can be studied within the framework of bifurcation theory. Degradation is another related phenomenon arising from cyclic loading, ageing, weathering, chemical attack and capillary effects among others. The methodology of analyzing the various types of instabilities is crucial in the adequate modelling and safe design of numerous problems in geomechanics. The present volume contains a sampling of enlarged versions of papers presented at the International Workshop on Bifurcation and Degradations in Geomaterials (IWBDG 2008) held in Lake Louise, Alberta, Canada, May 28-31, 2008. These papers capture the state of the art in the specialized field of geomechanics and contemporary approaches to solving the central issue of failure. Some engineering applications are presented in the areas of energy resource extraction and soil-machine interaction.

Advances in Bifurcation and Degradation in Geomaterials Stéphane Bonelli, Cristian Dascalu, François Nicot, 2011-08-03 This book presents contributions to the 9th International Workshop on Bifurcation and Degradation in Geomaterials held in Porquerolles, France, May 23-26, 2011. This series of conferences started in the early 1980s and is dedicated to the research on degradation and instability phenomena in geomaterials. The volume gathers a series of manuscripts by brilliant international scholars reflecting recent trends in theoretical and experimental research in geomechanics. It incorporates contributions on topics like instability analysis, localized and diffuse failure, description, multi-scale modeling and applications to geo-environmental issues. This book will be valuable for anyone interested in the research on degradation and instabilities in geomechanics and geotechnical engineering, appealing to graduate students, researchers and engineers alike.

Instabilities Modeling in Geomechanics Ioannis Stefanou, Jean Sulem, 2021-03-24 *Instabilities Modeling in Geomechanics* describes complex mechanisms which are frequently met in earthquake nucleation, geothermal energy production, nuclear waste disposal and CO₂ sequestration. These mechanisms involve systems of non-linear differential equations that express the evolution of the geosystem, e.g. strain localization, temperature runaway, pore pressure build up etc. at different length and time scales. In order to study the evolution of a system and possible instabilities, it is essential to know the mathematical properties of the governing equations. Therefore, questions of the existence, uniqueness and stability of

solutions naturally arise This book particularly explores bifurcation theory and stability analysis which are robust and rigorous mathematical tools that allow us to study the behavior of complex geosystems without even explicitly solving the governing equations The contents are organized into 10 chapters which illustrate the application of these methods in various fields of geomechanics *Bifurcations, Instabilities and Degradations in Geomaterials* Richard Wan, Mustafa Alsaleh, Joe Labuz, 2011-04-20 Geomaterials exhibit complex but rich mechanical behaviour with a variety of failure modes ranging from diffuse to localized deformation depending on stress density microstructure and loading conditions These failure modes are a result of an instability of material and or geometric nature that can be studied within the framework of bifurcation theory Degradation is another related phenomenon arising from cyclic loading ageing weathering chemical attack and capillary effects among others The methodology of analyzing the various types of instabilities is crucial in the adequate modelling and safe design of numerous problems in geomechanics The present volume contains a sampling of enlarged versions of papers presented at the International Workshop on Bifurcation and Degradations in Geomaterials IWBDG 2008 held in Lake Louise Alberta Canada May 28 31 2008 These papers capture the state of the art in the specialized field of geomechanics and contemporary approaches to solving the central issue of failure Some engineering applications are presented in the areas of energy resource extraction and soil machine interaction **Analytical Methods in Petroleum Upstream Applications**

Cesar Ovalles, Carl E. Rechsteiner Jr., 2015-04-02 Effective measurement of the composition and properties of petroleum is essential for its exploration production and refining however new technologies and methodologies are not adequately documented in much of the current literature Analytical Methods in Petroleum Upstream Applications explores advances in the analytical methods and instrumentation that allow more accurate determination of the components classes of compounds properties and features of petroleum and its fractions Recognized experts explore a host of topics including A petroleum molecular composition continuity model as a context for other analytical measurements A modern modular sampling system for use in the lab or the process area to collect and control samples for subsequent analysis The importance of oil in water measurements and monitoring The chemical and physical properties of heavy oils their fractions and products from their upgrading Analytical measurements using gas chromatography and nuclear magnetic resonance NMR applications Asphaltene and heavy ends analysis Chemometrics and modeling approaches for understanding petroleum composition and properties to improve upstream midstream and downstream operations Due to the renaissance of gas and oil production in North America interest has grown in analytical methods for a wide range of applications The understanding provided in this text is designed to help chemists geologists and chemical and petroleum engineers make more accurate estimates of the crude value to specific refinery configurations providing insight into optimum development and extraction schemes

Bifurcation and Degradation of Geomaterials with Engineering Applications Euripides Papamichos, Panos Papanastasiou, Elena Pasternak, Arcady Dyskin, 2017-04-21 This book contains the scientific contributions to the 11th

International Workshop on Bifurcation and Degradation in Geomaterials IWBDG held in Limassol Cyprus May 21 25 2017 The IWBDG series have grown in size and scope since their inception 30 years ago in Germany covering more and wider areas of geomaterials and geomechanics research including modern trends The papers cover a wide range of topics including advances in instabilities localized and diffuse failure micromechanical multiscale phenomena multiphysics modeling and other related topics This volume gathers a series of manuscript by brilliant international scholars who work on modern recent advances in experimental theoretical and numerical methods The theoretical and applied mechanics are linked successfully with engineering applications in traditional and in emerging fields such as geomechanics for the energy and the environment The quality of the contributed papers has benefited from the peer review process by expert referees This book can be used as a useful reference for research students academics and practicing engineers who are interested in the instability and degradation problems in geomaterials geomechanics geotechnical engineering and other related applications

Rock Engineering and Rock Mechanics: Structures in and on Rock Masses R. Alejano,Áurea Peruchó,Claudio Olalla,Rafael Jiménez,2014-05-12 Rock Engineering and Rock Mechanics Structures in and on Rock Masses covers the most important topics and state of the art in the area of rock mechanics with an emphasis on structures in and on rock masses The 255 contributions including 6 keynote lectures from the 2014 ISRM European Rock Mechanics Symposium EUROCK 2014 Vigo Spain 27 29 Ma **Rainfall-Induced Soil Slope Failure** Lulu Zhang,Jinhui Li,Xu Li,Jie Zhang,Hong Zhu,2018-09-03

Rainfall induced landslides are common around the world With global climate change their frequency is increasing and the consequences are becoming greater Previous studies assess them mostly from the perspective of a single discipline correlating landslides with rainstorms geomorphology and hydrology in order to establish a threshold prediction value for rainfall induced landslides analyzing the slope s stability using a geomechanical approach or assessing the risk from field records Rainfall Induced Soil Slope Failure Stability Analysis and Probabilistic Assessment integrates probabilistic approaches with the geotechnical modeling of slope failures under rainfall conditions with unsaturated soil It covers theoretical models of rainfall infiltration and stability analysis reliability analysis based on coupled hydro mechanical modelling stability of slopes with cracks gravels and spatial heterogenous soils and probabilistic model calibration based on measurement It focuses on the uncertainties involved with rainfall induced landslides and presents state of the art techniques and methods which characterize the uncertainties and quantify the probabilities and risk of rainfall induced landslide hazards Additionally the authors cover The failure mechanisms of rainfall induced slope failure Commonly used infiltration and stability methods The infiltration and stability of natural soil slopes with cracks and colluvium materials Stability evaluation methods based on probabilistic approaches The effect of spatial variability on unsaturated soil slopes and more Multiscale Modeling of Complex Materials Tomasz Sadowski,Patrizia Trovalusci,2014-10-14 The papers in this volume deal with materials science theoretical mechanics and experimental and computational techniques at multiple scales

providing a sound base and a framework for many applications which are hitherto treated in a phenomenological sense The basic principles are formulated of multiscale modeling strategies towards modern complex multiphase materials subjected to various types of mechanical thermal loadings and environmental effects The focus is on problems where mechanics is highly coupled with other concurrent physical phenomena Attention is also focused on the historical origins of multiscale modeling and foundations of continuum mechanics currently adopted to model non classical continua with substructure for which internal length scales play a crucial role

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