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Hydromechanical Aspects and Unsaturated Flow in Jointed Rock

Buddhima Indraratna
Professor of Civil Engineering, University of Wollongong, NSW, Australia
Pathegama Ranjith
Lecturer, Civil Engineering, Nanyang Technological University, Singapore

Fluid flow analysis plays a major role in various geotechnical applications , including mining and petroleum industry. Predicting water-gas flows occurring within a network of rock joints under mining conditions is a very difficult task, due to the wide array of hydrogeological variables involved. Rock joints are usually unsaturated, and they conduct both gas/air and water together.

This book covers in detail, the fundamental aspects of fluid flow phenomena in a jointed rock mass, as well as various geological (structural) features and their influence on flow deformation characteristics. Various types of laboratory triaxial apparatus employed for testing saturated and unsaturated flow are also highlighted. Methods of testing and analysis of fluid flows have been compared where warranted, and modifications based on the authors' research findings are described. Especially, the salient features of a unique Two-Phase, High Pressure Triaxial Apparatus and its role in analysing the relative permeability of unsaturated flow through fractured rocks are presented. A new mathematical model representing two- phase flow in discontinuities is also introduced. The book is intended for final year thesis students, postgraduate researchers and practitioners.

CONTENTS

1. Characterization of jointed rock mass
2. Specialized triaxial equipment and laboratory procedures
3. Fully saturated fluid flow through a jointed rock mass
4. Unsaturated flow through a jointed rock mass
5. Fluid flow modelling techniques
6. Flow analysis through an interconnected fracture network - numerical modelling
7. Highlights of hydro-mechanical aspects of frac tured rocks and recommendations for further development

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This book covers in detail, the fundamental properties of rock joints, the methods of laboratory testing of rock joints, and shear strength assessment under different loading conditions. Various methods of testing and analysis developed previously have been compared where warranted, and modifications based on author's research findings are included. The use of the Constant Normal Stiffness method for analysing the behaviour of rock joints and representing the laboratory response in terms of stress paths are discussed in depth. A new shear strength model developed by the authors using a mathematical approach is also highlighted, with simplified practical applications. The book is intended as a reference text for both undergraduate thesis students, postgraduate researchers and for practitioners in mining and rock engineering.

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A discussion of the fundamental aspects of fluid flow phenomena in a jointed rock mass, as well as various geological (structural) features and their influence on flow deformation characteristics. Various types of laboratory triaxial apparatus used in testing are also highlighted. Related Subjects. Rock Mechanics. Rock Mechanics. Back to top. Our Customers. Authors. Water flow and hydromechanical coupling process in fractured rocks is more different from that in general porous media because of heterogeneous spatial fractures and possible fracture-dominated flow; a saturated-unsaturated hydromechanical coupling model using a discontinuous deformation analysis (DDA) similar to FEM and DEM was employed to analyze water movement in saturated-unsaturated deformed rocks, in which the Van-Genuchten model differently.Â The calibrating results for the dam foundation indicated the validation and feasibility of the proposed model and are also in good agreement with the calculations based on DEM still demonstrating its superiority. And then, the rainfall infiltration in a reservoir rock