Processes in Geomedia: Volume 2 - Springer Geology

Flow and Transport Phenomena in Geological Media

This volume of the Processes in Geomedia series examines processes occurring in geological media and provides an overview of research on modeling and experimental simulations. The text begins by addressing flow and transport phenomena occurring in geological media, with particular attention to fluid-structure interactions and couplings. The second part of the book discusses processes related to multi-phase flow and deformation in geological media, including the formation and evolution of geological structures and the generation of fluid-driven seismicity. The authors present a broad spectrum of modeling techniques, ranging from continuum-based finite-element methods to discrete element methods and particle-based methods, including detailed discussions of numerical methods and their respective advantages and limitations. The final chapter examines the use of experimental techniques for the study of processes in geological media, including rock physics, fault mechanics, and multi-phase flow experiments.

Processes in GeoMedia—Volume I (Springer Geology)

by Samanta Schweblin

4.1 out of 5

Language	: English
File size	: 39827 KB
Text-to-Speech	: Enabled
Screen Reader	: Supported
Enhanced typesetting	: Enabled
Word Wise	: Enabled
Print length	: 504 pages

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Processes in Geomedia Volume 2: Flow and Transport Phenomena in Geological Media is a valuable reference for researchers in the fields of geophysics, geomechanics, geological engineering, and applied mathematics, and for geoscientists seeking to learn about advanced modeling techniques for geological processes.

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Chapter 1:

This chapter provides an overview of the scope and objectives of the book. It introduces the concept of geomedia and discusses the importance of understanding flow and transport phenomena in geological media. The chapter also reviews the state-of-the-art in modeling and experimental techniques for studying flow and transport processes in geological media.

Chapter 2: Flow and Transport in Porous Media

This chapter presents the fundamental principles of flow and transport in porous media. It discusses the governing equations for flow and transport, as well as the various analytical and numerical methods used to solve these equations. The chapter also provides an overview of the different types of porous media, including their porosity, permeability, and tortuosity.

Chapter 3: Fluid-Structure Interactions in Geological Media

This chapter examines the interactions between fluid flow and geomechanical processes in geological media. It discusses the different types of fluid-structure interactions, including poroelasticity, thermoelasticity, and chemoelasticity. The chapter also presents the governing equations for fluid-structure interactions and reviews the various numerical methods used to solve these equations.

Chapter 4: Couplings Between Flow and Geomechanical Processes

This chapter discusses the couplings between flow and geomechanical processes in geological media. It presents the governing equations for coupled flow and geomechanical processes, as well as the various numerical methods used to solve these equations. The chapter also provides an overview of the different types of coupled flow and geomechanical processes, including poroelasticity, thermoelasticity, and chemoelasticity.

Part 2: Processes Related to Multi-Phase Flow and Deformation in Geological Media

Chapter 5: Multi-Phase Flow in Geological Media

This chapter presents the fundamental principles of multi-phase flow in geological media. It discusses the governing equations for multi-phase flow, as well as the various analytical and numerical methods used to solve these equations. The chapter also provides an overview of the different types of multi-phase flow, including immiscible flow, miscible flow, and reactive flow.

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This chapter examines the deformation of geological media under the influence of external forces. It discusses the different types of deformation, including elastic deformation, plastic deformation, and brittle deformation. The chapter also presents the governing equations for deformation and reviews the various numerical methods used to solve these equations.

Chapter 7: Formation and Evolution of Geological Structures

This chapter discusses the formation and evolution of geological structures, such as folds, faults, and fractures. It presents the different mechanisms responsible for the formation and evolution of geological structures, including tectonic forces, gravitational forces, and fluid-driven forces. The chapter also provides an overview of the different types of geological structures and their significance in understanding the Earth's history.

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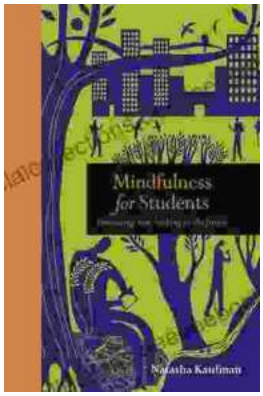

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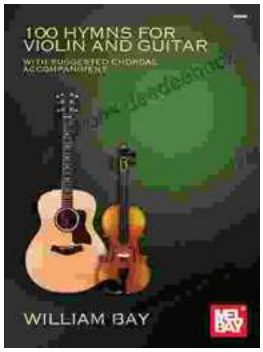

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