



Elements of Crustal Geomechanics

By François Henri Cornet

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This key textbook considers the mechanics of geomaterials at a wide range of scales, both in time and space. It provides a detailed introduction to the study of crustal geomechanics, focussing specifically on the seismogenic crust. The author demonstrates how continuum mechanics principles can provide efficient solutions to geomechanics problems at various scales, taking into account the multiphase characteristics of the geomaterials as well as discontinuities such as fractures and faults. Field and laboratory observations are combined with basic mathematical theory to build solutions with known levels of uncertainty. Particular consideration is given to the use of microseismicity. Case studies are provided, and practical results from numerical modelling are used to illustrate the applicability and limitations of current theories. Accessible explanations of mathematical formulations, convenient summaries of the key equations, and exercises make this a valuable reference for students and researchers in geomechanics, geophysics, structural geology and engineering.

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Editorial Review

Review

"This timely textbook meets a major world-wide need in education. The author correctly identifies mechanics as both the basis for understanding the complex response of the subsurface to natural or man-made forces, and as the lingua franca for effective dialog between geoscientists and engineers. The observations of behavior over a wide range of spatial and temporal scales is critical since many of the features of a rock mass cannot be replicated in a classical laboratory. Global demand for subsurface resources will certainly grow, and universities must equip graduates with the skills to meet this demand. Professor Cornet's book provides an excellent foundation upon which to build the necessary expertise." Charles Fairhurst, Professor Emeritus, University of Minnesota; Senior Consultant, Itasca Consulting Group, Inc.

"This book provides an excellent theoretical treatment of contemporary geomechanics - solid, fluid and thermal interactions in rocks accommodating rheology and rupture for static through dynamic conditions. Although presented at a high level, concepts are eminently accessible and aided by examples to highlight relevance in both geophysics and in engineering. This is destined to become a standard reference text for serious scholars spanning pure and applied geophysics through engineering geomechanics, with application to a process-based understanding in natural and engineered systems."

Derek Elsworth and Yves Guglielmi, Geomechanics and Geophysics for Geo-Energy and Geo-Resources

About the Author

François Henri Cornet is a Professor at the Institut de Physique du Globe de Strasbourg. Prior to this he worked in the Department of Seismology at the Institut de Physique du Globe de Paris, and was also Visiting Scientist at Stanford University and at The Lawrence Berkeley National Laboratory. His main research interests are in rock mechanics - specialising in measurement and modelling of stress fields; in rock-fluid interactions, including induced seismicity and application to geothermal energy development; and in the development of large scale, in situ, geophysical laboratories. Professor Cornet has extensive experience of teaching geomechanics courses at the undergraduate and graduate level, and has also consulted internationally on stress field evaluations.

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