1.	Record Nr.	UNINA9910795045103321
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	Titolo	Free boundaries in rock mechanics / / Anvarbek Meirmanov, Oleg V. Galtsev, Reshat N. Zimin
	Pubbl/distr/stampa	Berlin, [Germany] ; ; Boston, [Massachusetts] : , : De Gruyter, , 2017 ©2017
	ISBN	3-11-054504-7 3-11-054616-7
	Descrizione fisica	1 online resource (212 pages) : illustrations
	Collana	De Gruyter Series in Applied and Numerical Mathematics, , 2512-1820 ; ; Volume 1
	Disciplina	552/.06
	Soggetti	Boundary value problems Rock mechanics
	Lingua di pubblicazione	Inglese
	Formato	Materiale a stampa
	Livello bibliografico	Monografia
	Nota di bibliografia	Includes bibliographical references and index.
	Nota di contenuto	Frontmatter -- Preface -- Contents -- 1. Introduction -- 2. The Hele-Shaw problem -- 3. A joint motion of two immiscible viscous fluids -- 4. Mathematical models of in-situ leaching -- 5. Dynamics of cracks in rocks -- A. Elements of continuum mechanics -- References -- Index
	Sommario/riassunto	This monograph is concerned with free-boundary problems of partial differential equations arising in the physical sciences and in engineering. The existence and uniqueness of solutions to the Hele-Shaw problem are derived and techniques to deal with the Muskat problem are discussed. Based on these, mathematical models for the dynamics of cracks in underground rocks and in-situ leaching are developed. ContentsIntroductionThe Hele-Shaw problemA joint motion of two immiscible viscous fluidsMathematical models of in-situ leachingDynamics of cracks in rocksElements of continuum mechanics