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Collana	Lecture Notes in Physics, , 1616-6361 ; ; 1029
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Soggetti	Statistical physics Condensed matter System theory Porous materials Mathematical physics Computer simulation Geophysics Statistical Physics Phase Transition and Critical Phenomena Complex Systems Porous Materials Computational Physics and Simulations
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Nota di contenuto	Introduction to Percolation -- One-dimensional Percolation -- Infinite-dimensional Percolation -- Finite-dimensional Percolation -- Geometry of Clusters -- Finite Size Scaling -- Renormalization -- Subset Geometry -- Flow in Disordered Media -- Elastic Properties of Disordered Media -- Diffusion in Disordered Media -- Dynamic Processes in Disordered Media -- References -- Index.
Sommario/riassunto	This course-based open access textbook delves into percolation theory, examining the physical properties of random media—materials characterized by varying sizes of holes and pores. The focus is on both the mathematical foundations and the computational and statistical methods used in this field. Designed as a practical introduction, the

book places particular emphasis on providing a comprehensive set of computational tools necessary for studying percolation theory. Readers will learn how to generate, analyze, and comprehend data and models, with detailed theoretical discussions complemented by accessible computer codes. The book's structure ensures a complete exploration of worked examples, encompassing theory, modeling, implementation, analysis, and the resulting connections between theory and analysis. Beginning with a simplified model system—a model porous medium—whose mathematical theory is well-established, the book subsequently applies the same framework to realistic random systems. Key topics covered include one- and infinite-dimensional percolation, clusters, scaling theory, diffusion in disordered media, and dynamic processes. Aimed at graduate students and researchers, this textbook serves as a foundational resource for understanding essential concepts in modern statistical physics, such as disorder, scaling, and fractal geometry.