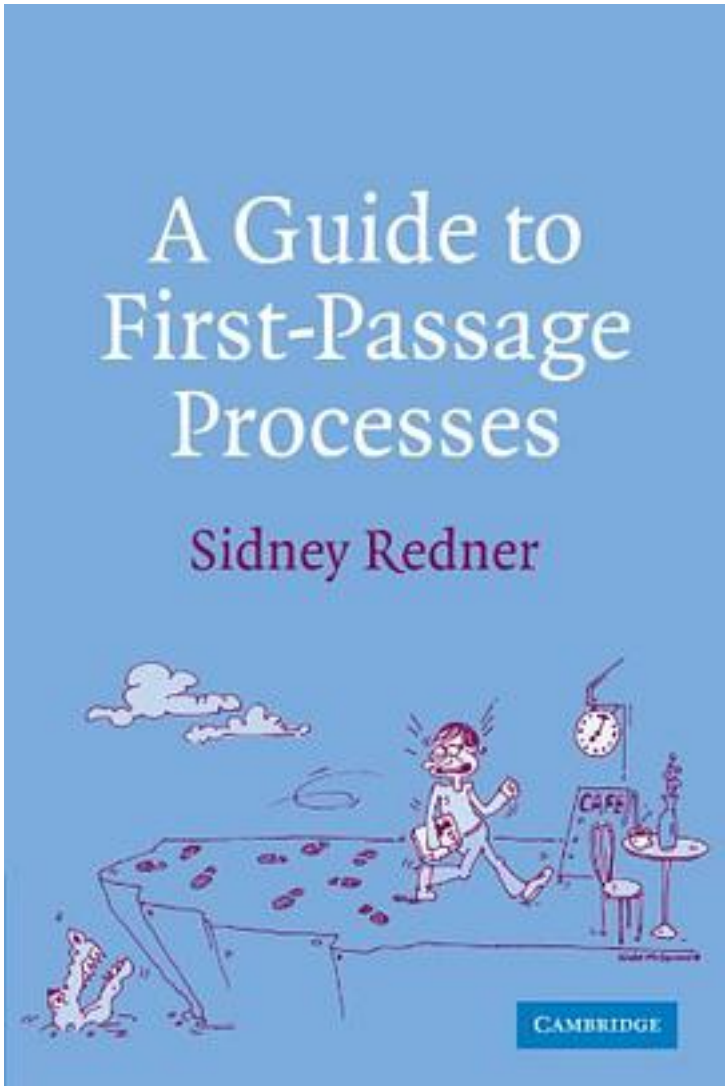
A Guide to First-passage Processes



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First-passage properties underlie a wide range of stochastic processes, such as diffusion-limited growth, neuron firing and the triggering of stock options. This book provides a unified presentation of first-passage processes, which highlights its interrelations with electrostatics and the resulting powerful consequences. The author begins with a presentation of fundamental theory including the connection between the occupation and first-passage probabilities of a random walk, and the connection to electrostatics and current flows in resistor networks. The consequences of this theory are then developed for simple, illustrative geometries including the finite and semi-infinite intervals, fractal networks, spherical geometries and the wedge. Various applications are presented including neuron dynamics, self-organized criticality, diffusion-limited aggregation, the dynamics of spin systems and the kinetics of diffusion-controlled reactions. First-passage processes provide an appealing way for graduate students and researchers in physics, chemistry, theoretical biology, electrical engineering, chemical engineering, operations research and finance to understand all of these systems.

作者介绍:

目录:

A Guide to First-passage Processes_下载链接1_

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