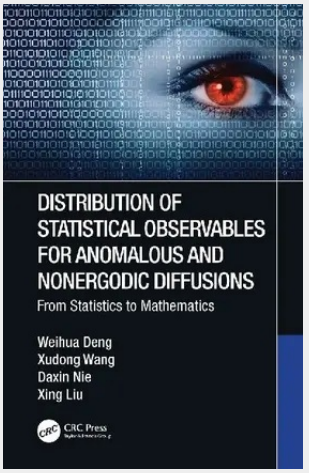
Deng / Wang / Nie

Distribution of Statistical Observables for Anomalous and Nonergodic Diffusions

From Statistics to Mathematics



This book investigates statistical observables for anomalous and nonergodic dynamics, focusing on the dynamical behaviors of particles modelled by non-Brownian stochastic processes in the complex real-world environment. Statistical observables are widely used for anomalous and nonergodic stochastic systems, thus serving as a key to uncover their dynamics. This study explores the cutting edge of anomalous and nonergodic diffusion from the perspectives of mathematics, computer science, statistical and biological physics, and chemistry. With this interdisciplinary approach, multiple physical applications and mathematical issues are discussed, including stochastic and deterministic modelling, analyses of (stochastic) partial differential equations (PDEs), scientific computations and stochastic analyses, etc. Through regularity analysis, numerical scheme design and numerical experiments, the book also derives the governing equations for the probability density function of statistical observables, linking stochastic processes with PDEs. The book will appeal to both researchers of electrical engineering expert in the niche area of statistical observables and stochastic systems and scientists in a broad range of fields interested in anomalous diffusion, especially applied mathematicians and statistical physicists.

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