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Mathematics : Probability Theory and Stochastic Processes

Berglund, Nils, Gentz, Barbara

Noise-Induced Phenomena in Slow-Fast Dynamical Systems

A Sample-Paths Approach

- The approach used here allows researchers and practitioners to quantitatively describe domains in a way that is close to reality - this is the first approach to do this
- Several concrete examples are described in detail to show how the method works in practice. The examples are from physics and climatology - two of the main disciplines to use these methods

Stochastic differential equations play an increasingly important role in modeling the dynamics of a large variety of systems in the natural sciences, and in technological applications. This book is aimed at advanced undergraduate and graduate students, and researchers in mathematics, physics, the natural sciences, and engineering. It presents a new constructive approach to the quantitative description of solutions to systems of stochastic differential equations evolving on well-separated timescales. The method, which combines techniques from stochastic analysis and singular perturbation theory, allows the domains of concentration for typical sample paths to be determined, and provides precise estimates on the transition probabilities between these domains. In addition to the detailed presentation of the set-up and mathematical results, applications to problems in physics, biology, and climatology are discussed.

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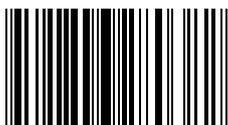
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