"Jinqiao Duan's book introduces the reader to the actively developing theory of stochastic dynamics through well-chosen examples that provide an overview, useful insights, and intuitive understanding of an often technically complicated topic."

– P. E. Kloeden, Goethe University, Frankfurt am Main

"Randomness is an important component of modeling complex phenomena in biological, chemical, physical, and engineering systems. Based on many years teaching this material, Jinqiao Duan develops a modern approach to the fundamental theory and application of stochastic dynamical systems for applied mathematicians and quantitative engineers and scientists. The highlight is the staged development of invariant stochastic structures that underpin much of our understanding of nonlinear stochastic systems and associated properties such as escape times. The book ranges from classic Brownian motion to noise generated by α-stable Levy flights."

– A. J. Roberts, University of Adelaide

This book serves as a concise introductory text on stochastic dynamics for applied mathematicians and scientists. Starting from the knowledge base typical for beginning graduate students in applied mathematics, it introduces the basic tools from probability and analysis and then develops for stochastic systems the properties traditionally calculated for deterministic systems. The book's final chapter opens the door to modeling in non-Gaussian situations, typical of many real-world applications. Rich with examples, illustrations, and exercises with solutions, this book is also ideal for self-study.

The aim of this series is to provide a focus for publishing textbooks in applied mathematics at the advanced undergraduate and beginning graduate level. It is planned that the books will be devoted to covering certain mathematical techniques and theories and exploring their applications.

Image: Pacific Storm Pair at 1415 UTC on 16 July 2012. Westbound Hurricane Fabio is aligned with an eastbound storm over the Pacific Northwest, with both swirls highlighted by the dawn. NASA–Goddard Space Flight Center, data from NOAA GOES.

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