Probability Theory and Stochastic Modelling

Vidyadhar Mandrekar · Barbara Rüdiger

Stochastic Integration in Banach Spaces

Theory and Applications

Considering Poisson random measures as the driving sources for stochastic (partial) differential equations allows us to incorporate jumps and to model sudden, unexpected phenomena. By using such equations the present book introduces a new method for modeling the states of complex systems perturbed by random sources over time, such as interest rates in financial markets or temperature distributions in a specific region. It studies properties of the solutions of the stochastic equations, observing the long-term behavior and the sensitivity of the solutions to changes in the initial data. The authors consider an integration theory of measurable and adapted processes in appropriate Banach spaces as well as the non-Gaussian case, whereas most of the literature only focuses on predictable settings in Hilbert spaces.

The book is intended for graduate students and researchers in stochastic (partial) differential equations, mathematical finance and non-linear filtering and assumes a knowledge of the required integration theory, existence and uniqueness results, and stability theory. The results will be of particular interest to natural scientists and the finance community. Readers should ideally be familiar with stochastic processes and probability theory in general, as well as functional analysis, and in particular the theory of operator semigroups.

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73

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