

Reflecting Stochastic Differential Equations with Jumps and Applications (Chapman & Hall/CRC Research Notes in Mathematics Series)

Situ Rong



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Many important physical variables satisfy certain dynamic evolution systems and can take only non-negative values. Therefore, one can study such variables by studying these dynamic systems. One can put some conditions on the coefficients to ensure non-negative values in deterministic cases. However, as a random process disturbs the system, the components of solutions to stochastic differential equations (SDE) can keep changing between arbitrary large positive and negative values-even in the simplest case. To overcome this difficulty, the author examines the reflecting stochastic differential equation (RSDE) with the coordinate planes as its boundary-or with a more general boundary.

Reflecting Stochastic Differential Equations with Jumps and Applications systematically studies the general theory and applications of these equations. In particular, the author examines the existence, uniqueness, comparison, convergence, and stability of strong solutions to cases where the RSDE has discontinuous coefficients-with greater than linear growth-that may include jump reflection. He derives the nonlinear filtering and Zakai equations, the Maximum Principle for stochastic optimal control, and the necessary and sufficient conditions for the existence of optimal control.

Most of the material presented in this book is new, including much new work by the author concerning SDEs both with and without reflection. Much of it appears here for the first time. With the application of RSDEs to various real-life problems, such as the stochastic population and neurophysiological control problems-both addressed in the text-scientists dealing with stochastic dynamic systems will find this an interesting and useful work.

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