

Floyd B. Hanson: Applied Stochastic Processes and Control for Jump-Diffusions

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The emphasis of this monograph is on modeling and practical applications rather than on mathematical formalism. Although the level is high, the book is perfectly accessible to a wide range of readers, from graduate students to any researcher interested on modeling of stochastic processes as they arise in applied math, biology, physics, engineering and finance.

The book contains 12 chapters within a bit over 400 pages. The first four chapters constitute an introduction to the subject including basic tools such as Itô calculus which is clearly explained. The rest of chapters are addressed to more advanced mathematical topics as well as a number suggested by practical applications. Thus we find stochastic calculus for general Markov processes, stochastic optimal control, Kolmogorov (i.e. Fokker-Planck) equations, stochastic simulations using Monte Carlo methods, and applications to finance (basically Black-Scholes and optimal portfolio theories) and to biology (e.g., diffusion and tumor growth).

Three appendices constitute a useful addition containing some technical details such as preliminaries in probability and analysis, deterministic optimal control and MATLAB programs. These appendices are found online at the SIAM address: www.siam.org/books/dc13. The book is based on graduate courses which the author has taught during a number of years at the applied mathematics department of the University of Illinois at Chicago. I believe that the book will be appealing and useful to students as well as researchers interested on applications of stochastic processes.

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