



# **Nonlinear Filtering and Smoothing: An Introduction to Martingales, Stochastic Integrals and Estimation (Dover Books on Electrical Engineering)**

*Venkatarama Krishnan*

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Most useful for graduate students in engineering and finance who have a basic knowledge of probability theory, this volume is designed to give a concise understanding of martingales, stochastic integrals, and estimation. It emphasizes applications. Many theorems feature heuristic proofs; others include rigorous proofs to reinforce physical understanding. Numerous end-of-chapter problems enhance the book's practical value.

After introducing the basic measure-theoretic concepts of probability and stochastic processes, the text examines martingales, square integrable martingales, and stopping times. Considerations of white noise and white-noise integrals are followed by examinations of stochastic integrals and stochastic differential equations, as well as the associated Ito calculus and its extensions. After defining the Stratonovich integral, the text derives the correction terms needed for computational purposes to convert the Ito stochastic differential equation to the Stratonovich form. Additional chapters contain the derivation of the optimal nonlinear filtering representation, discuss how the Kalman filter stands as a special case of the general nonlinear filtering representation, apply the nonlinear filtering representations to a class of fault-detection problems, and discuss several optimal smoothing representations.

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