



Stochastic Dynamics and Control (Monograph Series on Nonlinear Science and Complexity)

Jian-Qiao Sun

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This book is a result of many years of author's research and teaching on random vibration and control. It was used as lecture notes for a graduate course. It provides a systematic review of theory of probability, stochastic processes, and stochastic calculus. The feedback control is also reviewed in the book. Random vibration analyses of SDOF, MDOF and continuous structural systems are presented in a pedagogical order. The application of the random vibration theory to reliability and fatigue analysis is also discussed. Recent research results on fatigue analysis of non-Gaussian stress processes are also presented. Classical feedback control, active damping, covariance control, optimal control, sliding control of stochastic systems, feedback control of stochastic time-delayed systems, and probability density tracking control are studied. Many control results are new in the literature and included in this book for the first time. The book serves as a reference to the engineers who design and maintain structures subject to harsh random excitations including earthquakes, sea waves, wind gusts, and aerodynamic forces, and would like to reduce the damages of structural systems due to random excitations.

- Comprehensive review of probability theory, and stochastic processes
- Random vibrations
- Structural reliability and fatigue, Non-Gaussian fatigue
- Monte Carlo methods
- Stochastic calculus and engineering applications
- Stochastic feedback controls and optimal controls
- Stochastic sliding mode controls
- Feedback control of stochastic time-delayed systems
- Probability density tracking control

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