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Backward Equation; 7.1. Derivation of the backward equation; 7.2. Reliability formulation; 7.3. First-passage time probability; 7.4. Pontryagin-Vitt equations; Exercises; Capter 8. Random Vibration of SDOF Systems; 8.1. Solutions in the mean square sense; 8.2. Solutions with Ito calculus; Exercises; Chapter 9. Random Vibration of MDOF Discrete Systems; 9.1. Lagrange's equation
9.2. Modal solutions of MDOF systems9.3. Response statistics; 9.4. State space representation and Ito calculus; 9.5. Filtered white noise excitation; Exercises; Chapter 10. Random Vibration of Continuous Structures; 10.1. Distributed random excitations; 10.2. One-dimensional structures; 10.3. Two-dimensional structures; Exercises; Chapter 11. Structural Reliability; 11.1. Modes of failure; 11.2. Level crossing; 11.3. Vector process; 11.4. First-passage reliability based on level crossing; 11.5. First-passage time probability - general approach; 11.6. Structural fatigue
11.7. Dirlik's formula for fatigue prediction11.8. Extended Dirlik's formula for non-Gaussian stress; Exercises; Chapter 12. Monte Carlo Simulation; 12.1. Random numbers; 12.2. Random processes; 12.3. Stochastic differential equations; 12.4. Simulation of non-Gaussian processes; Exercises; Chapter 13. Elements of Feedback Controls; 13.1. Transfer function of linear dynamical systems; 13.2. Concepts of stability; 13.3. Effects of poles and zeros; 13.4. Time domain specifications; 13.5. PID controls; 13.6. Routh's stability criterion; 13.7. Root locus design; Exercises
Chapter 14. Feedback Control of Stochastic Systems

Sommario/riassunto

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 proc