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2.6.1 Moments of the Walker Distribution and the Generating Function; 2.6.2 Master Equation for Lattice Random Walks and its General Solution; 2.6.3 Limit of Multiple-Step Random Walks on Small Time Scales
2.6.4 Continuum Limit and a Boundary Model2.7 Boundary Condition for the Backward Fokker-Planck Equation; 2.8 Boundary Condition for the Forward Fokker-Planck Equation; 2.9 Concluding Remarks; 2.10 Exercises; Part II Physics of Stochastic Processes; 3 The Master Equation; 3.1 Markovian Stochastic Processes; 3.2 The Master Equation; 3.3 One-Step Processes in Finite Systems; 3.4 The First-Passage Time Problem; 3.5 The Poisson Process in Closed and Open Systems; 3.6 The Two-Level System; 3.7 The Three-Level System; 3.8 Exercises; 4 The Fokker-Planck Equation; 4.1 General Fokker-Planck Equations
4.2 Bounded Drift-Diffusion in One Dimension4.3 The Escape Problem and its Solution; 4.4 Derivation of the Fokker-Planck Equation; 4.5 Fokker-Planck Dynamics in Finite State Space; 4.6 Fokker-Planck Dynamics with Coordinate-Dependent Diffusion Coefficient; 4.7 Alternative Method of Solving the Fokker-Planck Equation; 4.8 Exercises; 5 The Langevin Equation; 5.1 A System of Many Brownian Particles; 5.2 A Traditional View of the Langevin Equation; 5.3 Additive White Noise; 5.4 Spectral Analysis; 5.5 Brownian Motion in Three-Dimensional Velocity Space; 5.6 Stochastic Differential Equations
5.7 The Standard Wiener Process5.8 Arithmetic Brownian Motion; 5.9 Geometric Brownian Motion; 5.10 Exercises; Part III Applications; 6 One-Dimensional Diffusion; 6.1 Random Walk on a Line and Diffusion: Main Results; 6.2 A Drunken Sailor as Random Walker; 6.3 Diffusion with Natural Boundaries; 6.4 Diffusion in a Finite Interval with Mixed Boundaries; 6.5 The Mirror Method and Time Lag; 6.6 Maximum Value Distribution; 6.7 Summary of Results for Diffusion in a Finite Interval; 6.7.1 Reflected Diffusion; 6.7.2 Diffusion in a Semi-Open System; 6.7.3 Diffusion in an Open System; 6.8 Exercises
7 Bounded Drift-Diffusion Motion

Sommario/riassunto

Based on lectures given by one of the authors with many years of experience in teaching stochastic processes, this textbook is unique in combining basic mathematical and physical theory with numerous simple and sophisticated examples as well as detailed calculations.In addition, applications from different fields are included so as to strengthen the background learned in the first part of the book. With its exercises at the end of each chapter (and solutions only available to lecturers) this book will benefit students and researchers at different educational levels.Solutions manual