

Table of Contents

Introduction	1
Part I. One-dimensional Stochastic Differential Equations of First Order	
Chapter 1. Stochastic Integrals and Differentials	7
§ 1. The Wiener Process	7
§ 2. The Stochastic Integral	11
§ 3. Properties of Stochastic Integrals as Function of the Upper Limit	16
§ 4. Stochastic Integrals with Random Limits.	27
Chapter 2. The Solutions of Stochastic Differential Equations.	33
§ 5. Stochastic Differential Equations of First Order.	33
§ 6. Existence and Uniqueness of the Solutions	39
§ 7. Stochastic Equations which Depend on a Parameter	50
§ 8. Dependence of the Solutions of Stochastic Differential Equations on the Initial Data	59
Chapter 3. Solutions of Stochastic Differential Equations and Markov Diffusion Processes	63
§ 9. Markov Processes. Diffusion Processes	63
§ 10. Diffusion Processes as Solutions of Stochastic Equations	67
§ 11. Kolmogorov's Equation	73
§ 12. Measures in Function Space Induced by Diffusion Processes	80
§ 13. Formulas for Transition Density Functions.	91
§ 14. Kolmogorov's Equation for the Transition Probability Density	99
§ 15. Time-homogeneous Solutions of Stochastic Differential Equations	105
Chapter 4. Asymptotic Behavior of the Solutions of Stochastic Equations	114
§ 16. Bounded and Unbounded Solutions of Stochastic Equations	114

§ 17. Theorems on the Asymptotic Behavior of Solutions	124
§ 18. Ergodic Theorems.	134
§ 19. Stability of Solutions	145
§ 20. Some Other Limit Theorems	151
Chapter 5. Stochastic Differential Equations on a Finite Spatial Interval	159
§ 21. Boundary Conditions at the Ends of the Interval	159
§ 22. Processes with Absorption at the Boundary.	165
§ 23. Instantaneous Reflection at the Boundary	178
§ 24. Delayed Reflection at the Boundary.	193
§ 25. Processes with Jump Reflection at the Boundary	205
Part II. Systems of Stochastic Differential Equations	
Chapter 1. Vector Stochastic Differential Equations	215
§ 1. Stochastic Line Integrals	216
§ 2. Stochastic Line Integrals as Function of the Upper Limit. .	232
§ 3. Stochastic Differential Equations	237
Chapter 2. Stochastic Differential Equations without After-effect .	245
§ 4. Preliminary Remarks	245
§ 5. Some Special Types of Stochastic Integrals	247
§ 6. The Generalized Itô Formula for Stochastic Differentials	263
§ 7. Stochastic Differential Equations without After-effect . .	273
§ 8. Stochastic Differential Equations Depending on a Parameter. Differentiability w.r.t. the Initial Data	275
§ 9. Solutions of Stochastic Differential Equations as Markov Processes	288
§ 10. The Distribution of Functionals of the Solutions of Stochastic Differential Equations	300
§ 11. Some Problems Connected with Homogeneous Stochastic Differential Equations	304
Chapter 3. Asymptotic Behavior of the Solutions of Stochastic Differential Equations	310
§ 12. Stability of Solutions	310
§ 13. Boundedness of the Solutions of Stochastic Differential Equations	330
§ 14. Limit Theorems for Stochastic Differential Equations .	333
Bibliography	348
Index	351