

Contents

Introduction	1
1. Background Field Method in Quantum Field Theory	9
1.1 Generating Functional, Green Functions and Effective Action	9
1.2 Green Functions of Minimal Differential Operators	14
1.3 Divergences, Regularization and Renormalization	17
2. Technique for Calculation of De Witt Coefficients	21
2.1 Covariant Expansions in Curved Space	21
2.2 Elements of Covariant Expansions	27
2.3 Technique for Calculation of De Witt Coefficients	34
2.4 De Witt Coefficients a_3 and a_4	37
2.5 Effective Action of Massive Fields	46
3. Partial Summation of Schwinger–De Witt Expansion	51
3.1 Summation of Asymptotic Expansions	51
3.2 Covariant Methods for Investigation of Nonlocalities	53
3.3 Summation of First-Order Terms	57
3.4 Summation of Second-Order Terms	61
3.5 De Witt Coefficients in De Sitter Space	68
4. Higher-Derivative Quantum Gravity	77
4.1 Quantization of Gauge Field Theories	77
4.2 One-Loop Divergences in Minimal Gauge	83
4.3 One-Loop Divergences in Arbitrary Gauge and Vilkovisky’s Effective Action	94
4.4 Renormalization Group and Ultraviolet Asymptotics	101
4.5 Effective Potential	108
Conclusion	125

X Contents

References	127
Notation	141
Index	143