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Nota di contenuto	- Introduction and Main Results -- Part I Functional Analytic Approach to Heat Operators -- Preliminaries from Manifold Theory -- Finite Double-Norm and Trace-Class Operators on a Hilbert Space -- Hilbert-Schmidt and Trace-Class Operators on a Manifold -- Analytic Semigroups via Dunford Integrals -- Part II Pseudo-Differential Operators and Elliptic Boundary Value Problems -- L_p Theory of Pseudo-Differential Operators -- Elliptic Boundary Value Problems on a Manifold -- L_p Theory of Elliptic Boundary Value Problems -- Boutet de Monvel Calculus -- Pseudo-Differential Operator Approach to Agmon's Method -- Part III Analytic Semigroup Approach to Heat Operators -- Generation Theorem for Analytic Semigroups via Agmon's Method --

Hypoelliptic Robin Problems via Boutet de Monvel Calculus --
Distribution Kernel of Analytic Semigroups in the Hypoelliptic Case --
Part IV The Fundamental Solution for the Cauchy Problem -- The
Cauchy Problem for the Heat Operator on R^n -- Fundamental Solution
Operator for the Cauchy Problem on a Manifold -- Part V Symbolic
Calculus for Dirichlet, Neumann and Regular Robin Problems --
Symbolic Calculus near the Boundary -- Analytic Version of Weyl Bases
for the Heat Kernel on the Half Axis -- Symbolic Calculus for Boundary
Value Problems on a Manifold -- Part VI Transport Equations and Trace
Formulas on the Half Space -- Transport Equations via the Weyl–
Hörmander Calculus -- Several Trace Formulas for Auxiliary Operators
on the Half Space -- Part VII Heat Kernel Asymptotics for Dirichlet,
Neumann and Regular Robin Problems -- Heat Kernel Asymptotics for the Dirichlet
Problem -- Heat Kernel Asymptotics for the Neumann
Problem -- Heat Kernel Asymptotics for the Regular Robin Problem --
Heat Kernel Asymptotics for the Generalized Regular Robin Problem --
Part VIII Heat Kernel Asymptotics for the Hypoelliptic Robin Problem --
Heat Kernel Asymptotics for the Hypoelliptic Robin Problem --
Examples in the Plane R^2 -- Concluding Remarks.

Sommario/riassunto

This monograph guides the reader to the mathematical crossroads of heat equations and differential geometry via functional analysis. Following the recent trend towards constructive methods in the theory of partial differential equations, it makes extensive use of the ideas and techniques from the Weyl–Hörmander calculus of pseudo-differential operators to study heat Green operators through concrete calculations for the Dirichlet, Neumann, regular Robin and hypoelliptic Robin boundary conditions. Further, it provides detailed coverage of important examples and applications in elliptic and parabolic problems, illustrated with many figures and tables. A unified mathematical treatment for solving initial boundary value problems for the heat equation under general Robin boundary conditions is desirable, and leads to an extensive study of various aspects of elliptic and parabolic partial differential equations. The principal ideas are explicitly presented so that a broad spectrum of readers can easily understand the problem and the main results. The book will be of interest to readers looking for a functional analytic introduction to the meeting point of partial differential equations, differential geometry and probability.
