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Nota di contenuto	Intro -- Preface -- Contents -- Part I Geometric Analysis -- Analysis on Noncompact Manifolds and Index Theory: Fredholm Conditions and Pseudodifferential Operators -- 1 Introduction -- 2 Motivation and Some Classical Results -- 2.1 A Classical Case: Smooth, Compact Manifolds -- 2.2 Motivating Example: Cylindrical Ends -- 2.2.1 Polar Coordinates -- 2.2.2 The Black-Scholes Operator -- 2.2.3 Generalized Spherical Coordinates -- 2.2.4 Manifolds with Cylindrical Ends -- 3 Fredholm Operators on Manifolds with Nice Ends (Lie Manifolds) -- 3.1 Lie Manifolds -- 3.1.1 Definition of Lie Manifolds -- 3.1.2 Lie Manifolds and Geometry -- 3.1.3 Differential Operators -- 3.2 Formulation of the Main Result: Fredholm Conditions on ``Nice'' Manifolds -- 3.3 Examples and Applications -- 4 Pseudodifferential Operators and Problems -- 4.1 Problems -- References -- Singular Value Decomposition for the X-Ray Transforms on the Reduced Heisenberg Group, and a Two-Radius Theorem -- 1 Introduction -- 2 Definitions -- 2.1 Heisenberg Group -- 2.2 X-Ray Transform -- 3 Spectral Decomposition of Ir, Ir* and Ir* Ir -- 4 Intertwining Differential Operators -- 5 Ongoing Work -- Appendix -- Entry Functions on the Heisenberg Group -- Special Functions -- References -- Nonlocal Functionals with Non-standard Growth -- 1 Introduction -- 2 Nonlocal

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3 Duality Estimates for Cocancelling Operators -- 4 Further Results -- References -- Scattering of Maxwell Potentials on Curved Spacetimes -- 1 Introduction -- 2 Background Spacetimes and Field Equations -- 2.1 CSCD Spacetimes -- 2.2 Field Equations -- 3 Main Results -- 4 Remarks -- 4.1 Conformal Scale -- 4.2 Spaces of Data -- 4.3 Goursat Problem -- 4.4 Role of Timelike Conformal Symmetry -- References -- Part II Analysis and PDEs -- Remark on the Ill-Posedness for KdV-Burgers Equation in Fourier Amalgam Spaces -- 1 Introduction -- 2 Proof of Theorem 1 -- References -- -Convergence for the Bi-Laplace-Beltrami Equationon Hypersurfaces -- 1 Introduction -- 2 Auxiliary Materials -- 3 Variational Formulation of Model Problem and Convergence -- References -- Bounded Weak Solutions with Orlicz Space Data: An Overview -- 1 Introduction: Uniformly Elliptic Operators -- 2 Degenerate Elliptic Operators -- 3 Further Remarks -- References -- Recent Progress on the Mathematical Theory of Wave Turbulence -- 1 Introduction -- 1.1 Description of the Theory -- 1.1.1 Scope of the Theory -- 1.1.2 Applications -- 1.2 Mathematical Literature -- 2 Main Results -- 2.1 Discussions -- 2.2 Related Works -- 2.3 Main Ideas in the Proof -- References -- Laplace-Beltrami Equation on Lipschitz Hypersurfaces in the Generic Bessel Potential Spaces -- 1 Introduction and Formulation of the Main Results -- Introduction and formulation of the problems -- 2 Generic Bessel Potential Spaces and Mellin Convolutions -- 3 Localization and the Model Problems, Proof of the Main Result -- References -- On the Convergence Fourier Series and Greedy Algorithm by Multiplicative System -- 1 Introduction -- 2 New Results: (Theorems) -- References -- Asymptotics of Harmonic Functions in the Absence of Monotonicity Formulas -- 1 Introduction.
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Sommario/riassunto

This volume presents modern developments in analysis, PDEs and geometric analysis by some of the leading worldwide experts, prominent junior and senior researchers who were invited to be part of the Ghent Analysis & PDE Center Methusalem Seminars from 2021 to 2022. The contributions are from the speakers of the Methusalem Colloquium, Methusalem Junior Seminar and Geometric Analysis Seminar. The volume has two main topics: 1. Analysis and PDEs. The volume presents recent results in fundamental problems for solving partial integro-differential equations in different settings such as Euclidean spaces, manifolds, Banach spaces, and many others. Discussions about the global and local solvability using micro-local and harmonic analysis methods, studies of new techniques and approaches

arising from a physical perspective or the mathematical point of view have also been included. Several connected branches arising in this regard are shown. 2. Geometric analysis. The volume presents studies of modern techniques for elliptic and subelliptic PDEs that in recent times have been used to establish new results in differential geometry and differential topology. These topics involve the intrinsic research in microlocal analysis, geometric analysis, and harmonic analysis abroad. Different problems having relevant geometric information for different applications in mathematical physics and other problems of classification have been considered.