1. Record Nr. UNIBAS000016487

Autore	Hurewicz, Witold
Titolo	Lectures on ordinary differential equations / Witold Hurewicz
Pubbl/distr/stampa	New York : Dover, 1990
ISBN	0-486-66420-1
Descrizione fisica	XVII, 122 p. ; 22 cm.
Collana	Dover books on advanced mathematics
Disciplina	515.352
Soggetti	Equazioni differenziali
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia

2. Record Nr. UNINA9910758501003321

Autore	Kurasov P
Titolo	Spectral Geometry of Graphs / / by Pavel Kurasov
Pubbl/distr/stampa	Berlin, Heidelberg : , : Springer Berlin Heidelberg : , : Imprint : Birkhäuser, , 2024
ISBN	9783662678725 3662678721
Edizione	[1st ed. 2024.]
Descrizione fisica	1 online resource (0 pages)
Collana	Operator Theory: Advances and Applications, , 2296-4878 ; ; 293
Disciplina	006.3843 530.12
Soggetti	Quantum computers Mathematical analysis System theory Control theory Mathematical optimization Calculus of variations Quantum Computing Analysis Systems Theory, Control Calculus of Variations and Optimization Teoria espectral (Matemàtica) Operadors diferencials

	Mètodes gràfics Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Notations -- Conventions -- Contents -- 1 Very Personal Introduction -- 2 How to Define Differential Operators on Metric Graphs -- 2.1 Schrödinger Operators on Metric Graphs -- 2.1.1 Metric Graphs -- 2.1.2 Differential Operators -- 2.1.3 Standard Vertex Conditions -- 2.1.4 Definition of the Operator -- 2.2 Elementary Examples -- 3 Vertex Conditions -- 3.1 Preliminary Discussion -- 3.2 Vertex Conditions for the Star Graph -- 3.3 Vertex Conditions Via the Vertex Scattering Matrix -- 3.3.1 The Vertex Scattering Matrix -- 3.3.2 Scattering Matrix as a Parameterin the Vertex Conditions -- 3.3.3 On Properly Connecting Vertex Conditions -- 3.4 Parametrisation Via Hermitian Matrices -- 3.5 Scaling-Invariant and Standard Conditions -- 3.5.1 Energy Dependence of the Vertex S-matrix -- 3.5.2 Scaling-Invariant, or Non-Robin Vertex Conditions -- 3.5.3 Standard Vertex Conditions -- 3.6 Signing Conditions for Degree Two Vertices -- 3.7 Generalised Delta Couplings -- 3.8 Vertex Conditions for Arbitrary Graphs and Definition of the Magnetic Schrödinger Operator -- 3.8.1 Scattering Matrix Parametrisationof Vertex Conditions -- 3.8.2 Quadratic Form Parametrisation of Vertex Conditions -- Appendix 1: Important Classes of Vertex Conditions -- and '-Couplings -- Circulant Conditions -- `Real' Conditions -- Indistinguishable Edges -- Equi-transmitting Vertices -- Appendix 2: Parametrisation of Vertex Conditions: Historical Remarks -- Parametrisation Via Linear Relations -- Parametrisation Using Hermitian Operators -- Unitary Matrix Parametrisation -- 4 Elementary Spectral Properties of Quantum Graphs -- 4.1 Quantum Graphs as Self-adjoint Operators -- 4.2 The Dirichlet Operator and the Weyl's Law -- 4.3 Spectra of Quantum Graphs -- 4.4 Laplacian Ground State -- 4.5 Bonus Section: Positivity of the Ground Statefor Quantum Graphs. 4.5.1 The Case of Standard Vertex Conditions -- 4.5.2 A Counterexample -- 4.5.3 Invariance of the Quadratic Form -- 4.5.4 Positivity of the Ground State for Generalised Delta-Couplings -- 4.6 First Spectral Estimates -- 5 The Characteristic Equation -- 5.1 Characteristic Equation I: Edge Transfer Matrices -- 5.1.1 Transfer Matrix for a Single Interval -- One-Dimensional Schrödinger Equation -- Magnetic Schrödinger Equation -- 5.1.2 The Characteristic Equation -- 5.1.3 The Characteristic Equation, Second Look -- 5.2 Characteristic Equation II: Scattering Approach -- 5.2.1 On the Scattering Matrix Associated with a Compact Interval -- 5.2.2 Positive Spectrum and Scattering Matrices for Finite Compact Graphs -- 5.3 Characteristic Equation III: M-Function Approach -- 5.3.1 M-Function for a Single Interval -- 5.3.2 The Edge M-Function -- 5.3.3 Characteristic Equation via the M-Function: General Vertex Conditions -- 5.3.4 Reduction of the M-Function for Standard Vertex Conditions -- 6 Standard Laplacians and Secular Polynomials -- 6.1 Secular Polynomials -- 6.2 Secular Polynomials for Small Graphs -- 6.3 Zero Sets for Small Graphs -- Appendix 1: Singular Sets on Secular Manifolds, Proof of Lemma 6.3

Sommario/riassunto

This open access book gives a systematic introduction into the spectral theory of differential operators on metric graphs. Main focus is on the fundamental relations between the spectrum and the geometry of the underlying graph. The book has two central themes: the trace formula and inverse problems. The trace formula is relating the spectrum to the set of periodic orbits and is comparable to the celebrated Selberg and Chazarain-Duistermaat-Guillemin-Melrose trace formulas. Unexpectedly this formula allows one to construct non-trivial crystalline measures and Fourier quasicrystals solving one of the long-standing problems in Fourier analysis. The remarkable story of this mathematical odyssey is presented in the first part of the book. To solve the inverse problem for Schrödinger operators on metric graphs the magnetic boundary control method is introduced. Spectral data depending on the magnetic flux allow one to solve the inverse problem in full generality, this means to reconstruct not only the potential on a given graph, but also the underlying graph itself and the vertex conditions. The book provides an excellent example of recent studies where the interplay between different fields like operator theory, algebraic geometry and number theory, leads to unexpected and sound mathematical results. The book is thought as a graduate course book

where every chapter is suitable for a separate lecture and includes problems for home studies. Numerous illuminating examples make it easier to understand new concepts and develop the necessary intuition for further studies.