1. Record Nr. UNINA9910133589203321

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Titolo	Green's functions and boundary value problems / / Ivar Stakgold, Michael J. Holst
Pubbl/distr/stampa	Hoboken, N.J., : Wiley, 2011
ISBN	1-280-76731-6 9786613678089 0-470-90652-9 0-470-90653-7
Edizione	[3rd ed.]
Descrizione fisica	1 online resource (883 p.)
Collana	Pure and applied mathematics ; ; 99
Altri autori (Persone)	HolstMichael J
Disciplina	515/.35
Soggetti	Boundary value problems Green's functions Mathematical physics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Green's Functions and Boundary Value Problems; CONTENTS; Preface to Third Edition; Preface to Second Edition; Preface to First Edition; 0. Preliminaries; 0.1 Heat Conduction; 0.2 Diffusion; 0.3 Reaction-Diffusion Problems; 0.4 The Impulse-Momentum Law: The Motion of Rods and Strings; 0.5 Alternative Formulations of Physical Problems; 0.6 Notes on Convergence; 0.7 The Lebesgue Integral; 1. Green's Functions (Intuitive Ideas); 1.1 Introduction and General Comments; 1.2 The Finite Rod; 1.3 The Maximum Principle; 1.4 Examples of Green's Functions; 2. The Theory of Distributions 2.1 Basic Ideas, Definitions, and Examples2.2 Convergence of Sequences and Series of Distributions; 2.3 Fourier Series; 2.4 Fourier Transforms and Integrals; 2.5 Differential Equations in Distributions; 2.6 Weak Derivatives and Sobolev Spaces; 3. One-Dimensional Boundary Value Problems; 3.1 Review; 3.2 Boundary Value Problems for Second-Order Equations; 3.3 Boundary Value Problems for Equations of Order p; 3.4 Alternative Theorems; 3.5 Modified Green's Functions; 4. Hubert and Banach Spaces; 4.1 Functions and Transformations; 4.2 Linear Spaces

4.3 Metric Spaces, Normed Linear Spaces, and Banach Spaces4.4 Contractions and the Banach Fixed-Point Theorem; 4.5 Hubert Spaces and the Projection Theorem; 4.6 Separable Hubert Spaces and Orthonormal Bases; 4.7 Linear Functionals and the Riesz Representation Theorem; 4.8 The Hahn-Banach Theorem and Reflexive Banach Spaces; 5. Operator Theory; 5.1 Basic Ideas and Examples; 5.2 Closed Operators; 5.3 Invertibility: The State of an Operator; 5.4 Adjoint Operators; 5.5 Solvability Conditions; 5.6 The Spectrum of an Operator; 5.7 Compact Operators; 5.8 Extremal Properties of Operators 5.9 The Banach-Schauder and Banach-Steinhaus Theorems6. Integral Equations; 6.1 Introduction; 6.2 Fredholm Integral Equations; 6.3 The Spectrum of a Self-Adjoint Compact Operator; 6.4 The Inhomogeneous Equation; 6.5 Variational Principles and Related Approximation Methods; 7. Spectral Theory of Second-Order Differential Operators; 7.1 Introduction; The Regular Problem; 7.2 Weyl's Classification of Singular Problems; 7.3 Spectral Problems with a Continuous Spectrum; 8. Partial Differential Equations; 8.1 Classification of Partial Differential Equations
8.2 Well-Posed Problems for Hyperbolic and Parabolic Equations8.3 Elliptic Equations; 8.4 Variational Principles for Inhomogeneous Problems; 8.5 The Lax-Milgram Theorem; 9. Nonlinear Problems; 9.1 Introduction and Basic Fixed-Point Techniques; 9.2 Branching Theory; 9.3 Perturbation Theory for Linear Problems; 9.4 Techniques for Nonlinear Problems; 9.5 The Stability of the Steady State; 10. Approximation Theory and Methods; 10.1 Nonlinear Analysis Tools for Banach Spaces; 10.2 Best and Near-Best Approximation in Banach Spaces; 10.3 Overview of Sobolev and Besov Spaces
10.4 Applications to Nonlinear Elliptic Equations

Sommario/riassunto

"This Third Edition includes basic modern tools of computational mathematics for boundary value problems and also provides the foundational mathematical material necssary to understand and use the tools. Central to the text is a down-to-earth approach that shows readers how to use differential and integral equations when tackling significant problems in the physical sciences, engineering, and applied mathematics, and the book maintains a careful balance between sound mathematics and meaningful applications. A new co-author, Michael J. Holst, has been added to this new edition, and together he and Ivar Stakgold incorporate recent developments that have altered the field of applied mathematics, particularly in the areas of approximation methods and theory including best linear approximation in linear spaces; interpolation of functions in Sobolev Spaces; spectral, finite volume, and finite difference methods; techniques of nonlinear approximation; and Petrov-Galerkin and Galerkin methods for linear equations. Additional topics have been added including weak derivatives and Sobolev Spaces, linear functionals, energy methods and A Priori estimates, fixed-point techniques, and critical and super-critical exponent problems. The authors have revised the complete book to ensure that the notation throughout remained consistent and clear as well as adding new and updated references. Discussions on modeling, Fourier analysis, fixed-point theorems, inverse problems, asymptotics, and nonlinear methods have also been updated"--