An Introduction To Hilbert Space Cambridge Mathematical Textbooks

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RICHARD BRODY

Introduction to Hilbert Spaces with Applications Elsevier
North-Holland Series in Applied Mathematics and Mechanics, Volume 6: Introduction to Spectral Theory in Hilbert Space focuses on the mechanics, principles, and approaches involved in spectral theory in Hilbert space. The publication first elaborates on the concept and specific geometry of Hilbert space and bounded linear operators. Discussions focus on projection and adjoint operators, bilinear forms, bounded linear mappings, isomorphisms, orthogonal subspaces, base, subspaces, finite dimensional Euclidean space, and normed linear spaces. The text then takes a look at the general theory of linear operators and spectral analysis of compact linear operators, including spectral decomposition of a compact selfadjoint operator, weakly convergent sequences, spectrum of a compact linear operator, and eigenvalues of a linear operator. The manuscript ponders on the spectral analysis of bounded linear operators and unbounded selfadjoint operators. Topics include spectral decomposition of an unbounded selfadjoint operator and bounded normal operator, functions of a unitary operator, step functions of a bounded selfadjoint operator, polynomials in a bounded operator, and order relation for bounded selfadjoint operators. The publication is a valuable source of data for mathematicians and researchers interested in spectral theory in Hilbert space.
Convex Analysis and Monotone Operator Theory in Hilbert Spaces Springer Science & Business Media
This textbook, first published in 2004, provides an introduction to the major mathematical structures used in physics today.
Introduction to Hilbert Spaces with Applications Springer Science & Business Media
The theory of operator spaces is very recent and can be described as a non-commutative Banach space theory. An 'operator space' is simply a Banach space with an embedding into the space B(H) of all bounded operators on a Hilbert space H. The first part of this book is an introduction with emphasis on examples that illustrate various aspects of the theory. The second part is devoted to applications to C*-algebras, with a systematic exposition of tensor products of C*-algebras. The third (and shorter) part of the book describes applications to non self-adjoint operator algebras, and similarity problems. In particular the author's counterexample to the 'Halmos problem' is presented, as well as work on the new concept of 'length' of an operator algebra. Graduate students and professional mathematicians interested in functional analysis, operator algebras and theoretical physics will find that this book has much to offer.
An Introduction to Hilbert Space Courier Dover Publications
This book offers an elementary and engaging introduction to operator theory on the Hardy-Hilbert space. It provides a firm foundation for the study of all spaces of analytic functions and of the operators on them. Blending techniques from "soft" and "hard" analysis, the book contains clear and beautiful proofs. There are numerous exercises at the end of each chapter, along with a brief guide for further study which includes references to applications to topics in engineering.
Theory of Linear Operators in Hilbert Space Springer
By a Hilbert-space operator we mean a bounded linear transformation be tween separable complex Hilbert spaces. Decompositions and models for Hilbert-space operators have been very active research topics in operator theory over the past three decades. The main motivation behind them is the in variant subspace problem: does every Hilbert-space operator have a nontrivial invariant subspace? This is perhaps the most celebrated open question in op erator theory. Its relevance is easy to explain: normal operators have invariant subspaces (witness: the Spectral Theorem), as well as operators on finite dimensional Hilbert spaces (witness: canonical Jordan form). If one agrees that each of these (i. e. the Spectral Theorem and canonical Jordan form) is important enough an achievement to dismiss any further justification, then the search for nontrivial invariant subspaces is a natural one; and a recalcitrant one at that. Subnormal operators have nontrivial invariant subspaces (extending the normal branch), as well as compact operators (extending the finite-dimensional branch), but the question remains unanswered even for equally simple (i. e. simple to define) particular classes of Hilbert-space operators (examples: hyponormal and quasinilpotent operators). Yet the invariant subspace quest has certainly not been a failure at all, even though far from being settled. The search for nontrivial invariant subspaces has undoubtly yielded a lot of nice results in operator theory, among them, those concerning decompositions and models for Hilbert-space operators. This book contains nine chapters.
Introduction to Spectral Theory Courier Corporation
The monograph is devoted to a systematic study of means of Hilbert space operators by a unified method based on the theory of double integral transformations and Peller's characterization of Schur multipliers. General properties on means of operators such as comparison results, norm estimates and convergence criteria are established. After some general theory, special investigations are focused on three one-parameter families of A-L-G (arithmetic-logarithmic-geometric) interpolation means, Heinz-type means and binomial means. In particular, norm continuity in the parameter is examined for such means. Some necessary technical results are collected as appendices.
Introduction to Hilbert Space Springer
This revised and expanded monograph presents the general theory for frames and Riesz bases in Hilbert spaces as well as its concrete realizations within Gabor analysis, wavelet analysis, and generalized shift-invariant systems. Compared with the first edition, more emphasis is put on explicit constructions with attractive properties. Based on the exiting development of frame theory over the last decade, this second edition now includes new sections on the rapidly growing fields of LCA groups, generalized shift-invariant systems, duality theory for as well Gabor frames as wavelet frames, and open problems in the field. Key features include: *Elementary introduction to frame theory in finite-dimensional spaces * Basic results presented in an accessible way for both pure and applied mathematicians * Extensive exercises make the work suitable as a textbook for use in graduate courses * Full proofs includ ed in introductory chapters; only basic knowledge of functional analysis required * Explicit constructions of frames and dual pairs of frames, with applications and connections to time-frequency analysis, wavelets, and generalized shift-invariant systems * Discussion of frames on LCA groups and the concrete realizations in terms of Gabor systems on the elementary groups; connections to sampling theory * Selected research topics presented with recommendations for more advanced topics and further readin g * Open problems to stimulate further research An Introduction to Frames and Riesz Bases will be of interest to graduate students and researchers working in pure and applied mathematics, mathematical physics, and engineering. Professionals working in digital signal processing who wish to understand the theory behind many modern signal processing tools may also find this book a useful self-study reference. Review of the first edition: "Ole Christensen’s An Introduction to Frames and Riesz Bases is a first-rate introduction to the field ... . The book provides an excellent exposition of these topics. The material is broad enough to pique the interest of many readers, the included exercises supply some interesting challenges, and the coverage provides enough background for those new to the subject to begin conducting original research." — Eric S. Weber, American Mathematical Monthly, Vol. 112, February, 2005
A Hilbert Space Problem Book Springer Science & Business Media
An accessible introduction to Hilbert spaces, combining the theory with applications of Hilbert methods in signal processing.
Introduction to Hilbert Spaces with Applications Cambridge University Press
The intention of this book is to introduce students to active areas of research in mathematical physics in a rather direct way minimizing the use of abstract mathematics. The main features are geometric methods in spectral analysis, exponential decay of eigenfunctions, semi-classical analysis of bound state problems, and semi-classical analysis of resonance. A new geometric point of view along with new techniques are brought out in this book which have both been discovered within the past decade. This book is designed to be used as a textbook, unlike the competitors which are either too fundamental in their approach or are too abstract in nature to be considered as texts. The authors' text fills a gap in the marketplace.
Applied Analysis by the Hilbert Space Method Springer Science & Business Media
"Continuing on the success of the two previous editions, Introduction to Hilbert Spaces with Applications, Third Edition, offers an overview of the basic ideas and results of Hilbert space theory complemented by a variety of applications. Students and researchers will benefit from the enhanced presentation of results and proofs and new and revised examples. A completely new section on Sobolev spaces has been added, and the treatment of finite dimensional normed spaces has been expanded. The chapter on wavelets has been updated."--BOOK JACKET.
A Primer on Hilbert Space Theory American Mathematical Soc.
The notion of a Hilbert space is a central idea in functional analysis and this text demonstrates its applications in numerous branches of pure and applied mathematics.
Introduction to Hilbert Space and the Theory of Spectral Multiplicity Cambridge University Press
Reproducing kernel Hilbert spaces have developed into an important tool in many areas, especially statistics and machine learning, and they play a valuable role in complex analysis, probability, group representation theory, and the theory of integral operators. This unique text offers a unified overview of the topic, providing detailed examples of applications, as well as covering the fundamental underlying theory, including chapters on interpolation and approximation, Cholesky and Schur operations on kernels, and vector-valued spaces. Self-contained and accessibly written, with exercises at the end of each chapter, this unrivalled treatment of the topic serves as an ideal introduction for graduate students across mathematics, computer science, and engineering, as well as a useful reference for researchers working in functional analysis or its applications.
An Introduction to Hilbert Space Cambridge University Press
This textbook is an introduction to functional analysis suited to final year undergraduates or beginning graduates. Its various applications of Hilbert spaces, including least squares approximation, inverse problems, and Tikhonov regularization, should appeal not only to mathematicians interested in applications, but also to researchers in related fields. Functional Analysis adopts a self-contained approach to Banach spaces and operator theory that covers the main topics, based upon the classical sequence and function spaces and their operators. It assumes only a minimum of knowledge in elementary linear algebra and real analysis; the latter is redone in the light of metric spaces. It contains more than a thousand worked examples and exercises, which make up the main body of the book.
Elements of Hilbert Spaces and Operator Theory American Mathematical Soc.
This graduate-level text opens with an elementary presentation of Hilbert space theory sufficient for understanding the rest of the book. Additional topics include boundary value problems, evolution equations, optimization, and approximation.1979 edition.
A Primer on Hilbert Space Theory Springer Nature

From the Preface: ``This textbook has evolved from a set of lecture notes ... In both the course and the book, I have in mind first- or second-year graduate students in Mathematics and related fields such as Physics ... It is necessary for the reader to have a foundation in advanced calculus which includes familiarity with: least upper bound (LUB) and greatest lower bound (GLB), the concept of function, ϵ's and their companion δ's, and basic properties of sequences of real and complex numbers (convergence, Cauchy's criterion, the Weierstrass-Bolzano theorem). It is not presupposed that the reader is acquainted with vector spaces ... , matrices ... , or determinants ... There are over four hundred exercises, most of them easy ... It is my hope that this book, aside from being an exposition of certain basic material on Hilbert space, may also serve as an introduction to other areas of functional analysis.''

Unbounded Self-adjoint Operators on Hilbert Space Springer Science & Business Media

This textbook provides an introduction to the methods and language of functional analysis, including Hilbert spaces, Fredholm theory for compact operators, and spectral theory of self-adjoint operators. It also presents the basic theorems and methods of abstract functional analysis and a few applications of these methods to Banach algebras and the theory of unbounded self-adjoint operators. The text corresponds to material for two semester courses (Part I and Part II, respectively) and is essentially self-contained. Prerequisites for the first part are minimal amounts of linear algebra and calculus. For the second part, some knowledge of topology and measure theory is recommended. Each of the 11 chapters is followed by numerous exercises, with solutions given at the end of the book. The amount of mathematics presented in the book can well be absorbed in a year's study and will provide a sound basis for future reading. It is suitable for graduate students and researchers interested in operator theory and functional analysis.

Introduction to Hilbert Space and the Theory of Spectral Multiplicity Springer Science & Business Media

Building on the success of the two previous editions, Introduction to Hilbert Spaces with Applications, Third Edition, offers an overview of the basic ideas and results of Hilbert space theory and functional analysis. It acquaints students with the Lebesgue integral, and includes an enhanced presentation of results and proofs. Students and researchers will benefit from the wealth of revised examples in new, diverse applications as they apply to optimization, variational and control problems, and problems in approximation theory, nonlinear instability, and bifurcation. The text also includes a popular chapter on wavelets that has been completely updated. Students and researchers agree that this is the definitive text on Hilbert Space theory. Updated chapter on wavelets Improved presentation on results and proof Revised examples and updated applications Completely updated list of references

Hilbert Spaces, Wavelets, Generalised Functions and Modern Quantum Mechanics Springer

Numerous worked examples and exercises highlight this unified treatment. Simple explanations of difficult subjects make it accessible to undergraduates as well as an ideal self-study guide. 1990 edition.

A Course in Modern Mathematical Physics Cambridge University Press

The book is a graduate text on unbounded self-adjoint operators on Hilbert space and their spectral theory with the emphasis on applications in mathematical physics (especially, Schrödinger operators) and analysis (Dirichlet and Neumann Laplacians, Sturm-Liouville operators, Hamburger moment problem) . Among others, a number of advanced special topics are treated on a text book level accompanied by numerous illustrating examples and exercises. The main themes of the book are the following: - Spectral integrals and spectral decompositions of self-adjoint and normal operators - Perturbations of self-adjointness and of spectra of self-adjoint operators - Forms and operators - Self-adjoint extension theory :boundary triplets, Krein-Birman-Vishik theory of positive self-adjoint extension

An Introduction to Hilbert Space Cambridge University Press

Historically, nonclassical physics developed in three stages. First came a collection of ad hoc assumptions and then a cookbook of equations known as "quantum mechanics". The equations and their philosophical underpinnings were then collected into a model based on the mathematics of Hilbert space. From the Hilbert space model came the abstaction of "quantum logics". This book explores all three stages, but not in historical order. Instead, in an effort to illustrate how physics and abstract mathematics influence each other we hop back and forth between a purely mathematical development of Hilbert space, and a physically motivated definition of a logic, partially linking the two throughout, and then bringing them together at the deepest level in the last two chapters. This book should be accessible to undergraduate and beginning graduate students in both mathematics and physics. The only strict prerequisites are calculus and linear algebra, but the level of mathematical sophistication assumes at least one or two intermediate courses, for example in mathematical analysis or advanced calculus. No background in physics is assumed.