Linear Operator Theory In Engineering And Science

Operator Theory in Function SpacesA Course in Operator TheoryThe Elements of Operator TheoryHardy Classes and Operator TheoryLimit Operators and Their Applications in Operator TheoryOperator Theory in Inner Product SpacesLectures on Operator TheoryTheory of Operator Algebras IElementary Operator TheoryIntroduction to Operator Theory IOperator Algebras, Operator Theory and ApplicationsOperator Theory in Different Settings and Related ApplicationsOperator Theory and Arithmetic in H [infinity]Operator TheoryContributions to Operator Theory in Spaces with an Indefinite MetricOperator theory for complex and hypercomplex analysisOperator Theory, Operator Algebras and ApplicationsLinear Operator Theory in Engineering and ScienceOperator Theory in Harmonic and Non-commutative AnalysisOperator Theory, Systems Theory and Scattering Theory: Multidimensional Generalizations Kehe Zhu John B. Conway Carlos S. Kubrusly Marvin Rosenblum Vladimir Rabinovich Karl-Heinz F□rster B. V. Rajarama Bhat Masamichi Takesaki Marat V. Markin A. Brown Maria Amélia Bastos Roland Duduchava Hari Bercovici Barry Simon Aad Dijksma Enrique Ramírez de Arellano M. Amélia Bastos Arch W. Naylor Joseph A. Ball Daniel Alpay

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this book covers toeplitz operators hankel operators and composition operators on both the bergman space and the hardy space the setting is the unit disk and the main emphasis is on size estimates of these operators boundedness compactness and membership in the schatten classes most results concern the relationship between operator theoretic properties of these operators and function theoretic properties of the inducing symbols thus a good portion of the book is devoted to the study of analytic function spaces such as the bloch space besov spaces and bmoa whose elements are to be used as symbols to induce the operators we study the book is intended for both research mathematicians and graduate students in complex analysis and operator theory the prerequisites are minimal a graduate course in each of real analysis complex analysis and functional analysis should sufficiently prepare the reader for the book exercises and bibliographical notes are provided at the end of each chapter these notes will point the reader to additional results and problems kehe zhu is a professor of mathematics at the state university of new york at albany his previous books include theory of bergman spaces springer 2000 with h hedenmalm and b korenblum and spaces of holomorphic functions in the unit ball springer 2005 his current research interests are holomorphic function spaces and operators acting on them

operator theory is a significant part of many important areas of modern mathematics functional analysis differential equations index theory representation theory mathematical physics and more this text covers the central themes of operator theory presented with the excellent clarity and style that readers have come to associate with conway s writing early chapters introduce and review material on c algebras normal operators compact operators and non normal operators some of the major topics covered are the spectral theorem the functional calculus and the fredholm index in addition some deep connections between operator theory and analytic functions are presented later chapters cover more advanced topics such as representations of c algebras compact perturbations and von neumann algebras major results such as the sz nagy dilation theorem the weyl von neumann berg theorem and the classification of von neumann algebras are covered as is a treatment of fredholm theory the last chapter gives an introduction to reflexive subspaces which along with hyperreflexive spaces are one of the more successful episodes in the modern study of asymmetric

algebras professor conway s authoritative treatment makes this a compelling and rigorous course text suitable for graduate students who have had a standard course in functional analysis

this second edition of elements of operator theory is a concept driven textbook that includes a significant expansion of the problems and solutions used to illustrate the principles of operator theory written in a user friendly motivating style intended to avoid the formula computational approach fundamental topics are presented in a systematic fashion i e set theory algebraic structures topological structures banach spaces and hilbert spaces culminating with the spectral theorem included in this edition more than 150 examples with several interesting counterexamples that demonstrate the frontiers of important theorems as many as 300 fully rigorous proofs specially tailored to the presentation 300 problems many with hints and an additional 20 pages of problems for the second edition this self contained work is an excellent text for the classroom as well as a self study resource for researchers

concise treatment focuses on theory of shift operators toeplitz operators and hardy classes of vector and operator valued functions topics include general theory of shift operators on a hilbert space use of lifting theorem to give a unified treatment of interpolation theorems of the pick nevanlinna and loewner types more appendix bibliography 1985 edition

this text has two goals it describes a topic band and band dominated operators and their fredholm theory and it introduces a method to study this topic limit operators band dominated operators let h 2 z be the hilbert space of all squared summable functions x z xi provided with the norm 2 2 x iixl1 l i ii iez it is often convenient to think of the elements x of 2 z as two sided infinite sequences xi iez the standard basis of 2 z is the family of sequences ei iez where ei 0 0 1 0 0 with the 1 standing at the ith place every bounded linear operator a on h can be described by a two sided infinite matrix aij i jez with respect to this basis where aij aej ei the band operators on h are just the operators with a matrix representation of finite band width i e the operators for which aij 0 whenever ii jl k for some k operators which are in the norm closure ofthe algebra of all band operators are called band dominated needless to say that band and band dominated operators appear in numerous branches of mathematics archetypal examples come from discretizations of partial differential operators it is easy to check that every band operator can be uniquely written as a finite sum l dkvk where the d are multiplication operators i e

this volume contains contributions written by participants of the 4th workshop on operator theory in krein spaces and applications held at the tu berlin germany december 17 to 19 2004 the workshop covered topics from spectral perturbation and extension theory of linear operators and relations in inner product spaces

this book resulted from the lectures held at the fields institute waterloo on canada leading international experts presented current results on the theory of c algebras and von neumann algebras together with recent work on the classification of c algebras much of the material in the book is appearing here for the first time and is not available elsewhere in the literature

mathematics for infinite dimensional objects is becoming more and more important today both in theory and application rings of operators renamed von neumann algebras by j dixmier were first introduced by j von neumann fifty years ago 1929 in 254 with his grand aim of giving a sound founda tion to mathematical sciences of infinite nature j von neumann and his collaborator f j murray laid down the foundation for this new field of mathematics operator algebras in a series of papers 240 241 242 257 and 259 during the period of the 1930s and early in the 1940s in the introduction to this series of investigations they stated their solution 1 to the problems of understanding rings of operators seems to be essential for the further advance of abstract operator theory in hilbert space under several aspects first the formal calculus with operator rings leads to them second our attempts to generalize the theory of unitary group representations essentially beyond their classical frame have always been blocked by the unsolved questions connected with these problems third various aspects of the quantum mechanical formalism suggest strongly the elucidation of this subject fourth the knowledge obtained in these investigations gives an approach to a class of abstract algebras without a finite basis which seems to differ essentially from all types hitherto investigated since then there has appeared a large volume of literature and a great deal of progress has been achieved by many mathematicians

the book is intended as a text for a one semester graduate course in operator theory to be taught from scratch not as a sequel to a functional analysis course with the basics of the spectral theory of linear operators taking the center stage the book consists of six chapters and appendix with the material flowing from the fundamentals of abstract spaces metric vector normed vector and inner product the banach fixed point theorem and its applications such as picard s existence and

uniqueness theorem through the basics of linear operators two of the three fundamental principles the uniform boundedness principle and the open mapping theorem and its equivalents the inverse mapping and closed graph theorems to the elements of the spectral theory including gelfand s spectral radius theorem and the spectral theorem for compact self adjoint operators and its applications such as the celebrated lyapunov stability theorem conceived as a text to be used in a classroom the book constantly calls for the student s actively mastering the knowledge of the subject matter there are problems at the end of each chapter starting with chapter 2 and totaling at 150 many important statements are given as problems and frequently referred to in the main body there are also 432 exercises throughout the text including chapter 1 and the appendix which require of the student to prove or verify a statement or an example fill in certain details in a proof or provide an intermediate step or a counterexample they are also an inherent part of the material more difficult problems are marked with an asterisk many problems and exercises are supplied with existential hints the book is generous on examples and contains numerous remarks accompanying definitions examples and statements to discuss certain subtleties raise questions on whether the converse assertions are true whenever appropriate or whether the conditions are essential with carefully chosen material proper attention given to applications and plenty of examples problems and exercises this well designed text is ideal for a one semester master s level graduate course in operator theory with emphasis on spectral theory for students majoring in mathematics physics computer science and engineering contents preface preliminaries metric spaces vector spaces normed vector spaces and banach spaces linear operators elements of spectral theory in a banach space setting elements of spectral theory in a hilbert space setting appendix the axiom of choice and equivalents bibliography index

this book was written expressly to serve as a textbook for a one or two semester introductory graduate course in functional analysis its soon to be published companion volume operators on hilbert space is in tended to be used as a textbook for a subsequent course in operator theory in writing these books we have naturally been concerned with the level of preparation of the potential reader and roughly speaking we suppose him to be familiar with the approximate equivalent of a one semester course in each of the following areas linear algebra general topology complex analysis and measure theory experience has taught us however that such a sequence of courses inevitably fails to treat certain topics that are important in the study of functional analysis and

operator theory for example tensor products are frequently not discussed in a first course in linear algebra likewise for the topics of convergence of nets and the baire category theorem in a course in topology and the connections between measure and topology in a course in measure theory for this reason we have chosen to devote the first ten chapters of this volume entitled part i to topics of a preliminary nature in other words part i summarizes in considerable detail what a student should and eventually must know in order to study functional analysis and operator theory successfully

this book is composed of three survey lecture courses and some twenty invited research papers presented to woat 2006 the international summer school and workshop on operator algebras operator theory and applications held at lisbon in september 2006 the volume reflects recent developments in the area of operator algebras and their interaction with research fields in complex analysis and operator theory the book is aimed at postgraduates and researchers in these fields

this book provides a selection of reports and survey articles on the latest research in the area of single and multivariable operator theory and related fields the latter include singular integral equations ordinary and partial differential equations complex analysis numerical linear algebra and real algebraic geometry all of which were among the topics presented at the 26th international workshop in operator theory and its applications held in tbilisi georgia in the summer of 2015 moreover the volume includes three special commemorative articles one of them is dedicated to the memory of leiba rodman another to murray marshall and a third to boris khvedelidze an outstanding georgian mathematician and one of the founding fathers of the theory of singular integral equations the book will be of interest to a broad range of mathematicians from graduate students to researchers whose primary interests lie in operator theory complex analysis and applications as well as specialists in mathematical physics

jordan s classification theorem for linear transformations on a finite dimensional vector space is a natural highlight of the deep relationship between linear algebra and the arithmetical properties of polynomial rings because the methods and results of finite dimensional linear algebra seldom extend to or have analogs in infinite dimensional operator theory it is therefore remarkable to have a class of operators which has a classification theorem analogous to jordan s classical result and has properties closely related to the arithmetic of the ring h infty of bounded analytic functions in the unit disk c 0 is such a class and is the central object of study in this book a contraction operator

belongs to c 0 if and only if the associated functional calculus on h infty has a nontrivial kernel c 0 was discovered by bela sz nagy and ciprian foias in their work on canonical models for contraction operators on hilbert space besides their intrinsic interest and direct applications operators of class c 0 are very helpful in constructing examples and counterexamples in other branches of operator theory in addition c 0 arises in certain problems of control and realization theory in this survey work the author provides a unified and concise presentation of a subject that was covered in many articles the book describes the classification theory of c 0 and relates this class to other subjects such as general dilation theory stochastic realization representations of convolution algebras and fredholm theory this book should be of interest to operator theorists as well as theoretical engineers interested in the applications of operator theory in an effort to make the book as self contained as possible the author gives an introduction to the theory of dilations and functional models for contraction operators prerequisites for this book are a course in functional analysis and an acquaintance with the theory of hardy spaces in the unit disk in addition knowledge of the trace class of operators is necessary in the chapter on weak contractions

a comprehensive course in analysis by poincaré prize winner barry simon is a five volume set that can serve as a graduate level analysis textbook with a lot of additional bonus information including hundreds of problems and numerous notes that extend the text and provide important historical background depth and breadth of exposition make this set a valuable reference source for almost all areas of classical analysis part 4 focuses on operator theory especially on a hilbert space central topics are the spectral theorem the theory of trace class and fredholm determinants and the study of unbounded self adjoint operators there is also an introduction to the theory of orthogonal polynomials and a long chapter on banach algebras including the commutative and non commutative gel fand naimark theorems and fourier analysis on general locally compact abelian groups

this volume is dedicated to heinz langer a leading expert in spectral analysis and its applications in particular to operators in spaces with an indefinite metric on the occasion of his 60th birthday the book begins with his biography and list of publications it contains a selection of research papers most of which are devoted to spectral analysis of operators or operator pencils with applications to ordinary and partial differential equations other papers deal with time varying systems interpolation

and factorization problems and topics from mathematical physics about half of the papers contain further developments in the theory of operators in spaces with an indefinite metric and treat new applications the book is of interest to a wide audience of pure and applied mathematicians

this book presents a collection of papers on certain aspects of general operator theory related to classes of important operators singular integral toeplitz and bergman operators convolution operators on lie groups pseudodifferential operators etc the study of these operator arises from integral representations for different classes of functions enriches pure operator theory and is influential and beneficial for important areas of analysis particular attention is paid to the fruitful interplay of recent developments of complex and hypercomplex analysis on one side and to operator theory on the other the majority of papers illustrate this interplay as well as related applications the papers represent the proceedings of the conference operator theory for complex and hypercomplex analysis held in december 1994 in mexico city

this book consists of research papers that cover the scientific areas of the international workshop on operator theory operator algebras and applications held in lisbon in september 2012 the volume particularly focuses on i operator theory and harmonic analysis singular integral operators with shifts pseudodifferential operators factorization of almost periodic matrix functions inequalities cauchy type integrals maximal and singular operators on generalized orlicz morrey spaces the riesz potential operator modification of hadamard fractional integro differentiation ii operator algebras invertibility in groupoid c algebras inner endomorphisms of some semi group crossed products c algebras generated by mappings which have finite orbits folner sequences in operator algebras arithmetic aspect of c r sl 2 c algebras of singular integral operators algebras of operator sequences and iii mathematical physics operator approach to diffraction from polygonal conical screens poisson geometry of difference lax operators

this book is a unique introduction to the theory of linear operators on hilbert space the authors goal is to present the basic facts of functional analysis in a form suitable for engineers scientists and applied mathematicians although the definition theorem proof format of mathematics is used careful attention is given to motivation of the material covered and many illustrative examples are presented first published in 1971 linear operator in engineering and sciences has since proved to be a popular and very useful textbook

this book contains the proceedings of the 23rd international workshop on operator theory and its applications iwota 2012 which was held at the university of new south wales sydney australia from 16 july to 20 july 2012 it includes twelve articles presenting both surveys of current research in operator theory and original results

this volume contains a selection of papers from experts in the area on multidimensional operator theory topics considered include the non commutative case function theory in the polydisk hyponormal operators hyperanalytic functions and holomorphic deformations of linear differential equations operator theory systems theory and scattering theory will be of interest to a wide audience of pure and applied mathematicians electrical engineers and theoretical physicists

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