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Analytic Methods for Coagulation-Fragmentation Models is a two-volume set that provides a comprehensive exposition of the mathematical analysis of coagulation-fragmentation models. Initially, an in-depth survey of coagulation-fragmentation processes is presented, together with an account of relevant early results obtained on the associated model equations. These provide motivation for the subsequent detailed treatment of more up-to-date investigations which have led to significant theoretical developments on topics such as solvability and the long-term behaviour of solutions. To make the account as self-contained as possible, the mathematical tools that feature prominently in these modern treatments are introduced at appropriate places. The main theme of Volume I is the analysis of linear fragmentation models, with Volume II devoted to processes that involve the nonlinear contribution of coagulation. Features of Volume I: The main models of the theory together with their derivations and early methods of solution A detailed presentation of the operator theoretical methods and semigroup theory that play an essential role in the theory of fragmentation processes A comprehensive theory of fragmentation processes, including fragmentation with growth and decay in both the discrete and continuous particle size cases An analytical explanation of the `pathologies' of the fragmentation equation, such as the shattering phase transition and non-uniqueness of solutions An analysis of the long-term

dynamics of the discrete size fragmentation equation with growth

This volume contains the proceedings of the workshop on Recent Trends in Operator Theory and Applications (RTOTA 2018), held from May 3–5, 2018, at the University of Memphis, Memphis, Tennessee. The articles introduce topics from operator theory to graduate students and early career researchers. Each such article provides insightful references, selection of results with articulation to modern research and recent advances in the area. Topics addressed in this volume include: generalized numerical ranges and their application to study perturbation of operators, and connections to quantum error correction; a survey of results on Toeplitz operators, and applications of Toeplitz operators to the study of reproducing kernel functions; results on the 2-local reflexivity problem of a set of operators; topics from the theory of preservers; and recent trends on the study of quotients of tensor product spaces and tensor operators. It also includes research articles that present overviews of state-of-the-art techniques from operator theory as well as applications to recent research trends and open questions. A goal of all articles is to introduce topics within operator theory to the general public.

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treatment of more up-to-date investigations which have led to significant theoretical developments on topics such as solvability and the long-term behaviour of solutions. To make the account as self-contained as possible, the mathematical tools that feature prominently in these modern treatments are introduced at appropriate places. The main theme of Volume I is the analysis of linear fragmentation models, with Volume II devoted to processes that involve the nonlinear contribution of coagulation. Features of Volume II: A primer on weak compactness in L 1 and dynamical systems A comprehensive theory of solvability of the coagulation-fragmentation equation by both the semigroup and weak compactness methods, including a thorough analysis of the gelation and shattering phenomena A detailed analysis of the long-term dynamics of the coagulation-fragmentation equations with a state-of-the-art discussion on self-similar solutions

This second volume of Analysis in Banach Spaces, Probabilistic Methods and Operator Theory, is the successor to Volume I, Martingales and Littlewood-Paley Theory. It presents a thorough study of the fundamental randomisation techniques and the operator-theoretic aspects of the theory. The first two chapters address the relevant classical background from the theory of Banach spaces, including notions like type, cotype, K-convexity and contraction principles. In turn, the next two chapters provide a detailed treatment of the theory of R-boundedness and Banach space valued square functions developed over the last 20 years. In the last chapter, this content is applied to

develop the holomorphic functional calculus of sectorial and bi-sectorial operators in Banach spaces. Given its breadth of coverage, this book will be an invaluable reference to graduate students and researchers interested in functional analysis, harmonic analysis, spectral theory, stochastic analysis, and the operator-theoretic approach to deterministic and stochastic evolution equations.

Reprinted by popular demand, this monograph presents a comprehensive study of positive operators between Riesz spaces and Banach lattices. Since publication of this book in 1985, the subject of positive operators and Riesz spaces has found practical applications in disciplines including social sciences and engineering. This book examines positive operators in the setting of Riesz spaces and Banach lattices, from both the algebraic and topological points of view.

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.

The famous problems of squaring the circle, doubling the cube and trisecting an angle captured the imagination of both professional and amateur mathematicians for over two thousand years. Despite the enormous effort and ingenious attempts by these men and women, the problems would not yield to purely geometrical methods. It was only the development. of abstract algebra in the nineteenth century which enabled mathematicians to arrive at the surprising conclusion that these constructions are not possible. In this book we develop enough abstract algebra to prove that these constructions are impossible. Our approach introduces all the relevant concepts about fields in a way which is more concrete than usual and which avoids the use of quotient structures (and even of the Euclidean algorithm for finding the greatest common divisor of two polynomials). Having the geometrical questions as a specific goal provides motivation for the introduction of the algebraic concepts and we have found that students respond very favourably. We have used this text to teach second-year students at La Trobe University over a period of many years, each time refining the material in the light of student performance.

This work focuses on various known criteria in the spectral theory of selfadjoint operators. The concise, unified presentation is aimed at graduate students and researchers working in the

spectral theory of Schrodinger operators with either fixed or random potentials. But given the large gap this book fills in the literature, it will serve a wider audience of mathematical physicists in its contribution to works in spectral theory.

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 1 is devoted to real analysis. From one point of view, it presents the infinitesimal calculus of the twentieth century with the ultimate integral calculus (measure theory) and the ultimate differential calculus (distribution theory). From another, it shows the triumph of abstract spaces: topological spaces, Banach and Hilbert spaces, measure spaces, Riesz spaces, Polish spaces, locally convex spaces, Fréchet spaces, Schwartz space, and spaces. Finally it is the study of big techniques, including the Fourier series and transform, dual spaces, the Baire category, fixed point theorems, probability ideas, and Hausdorff dimension. Applications include the constructions of nowhere differentiable functions, Brownian motion, space-filling curves, solutions of the moment problem, Haar measure, and equilibrium measures in potential theory.

Banach LatticesSpringer Science & Business MediaOperator Theory in Function Spaces and Banach LatticesEssays dedicated to A.C. Zaanen on the occasion of his 80th birthdayBirkhäuser

Famed mathematician Alexander Grothendieck, in his Resume, set forth his plan for the study of the finer structure of Banach spaces. He used tensor products as a foundation upon which

he built the classes of operators most important to the study of Banach spaces and established the importance of the "local" theory in the study of these operators and the spaces they act upon. When Lintenstrauss and Pelczynski addressed his work at the rebirth of Banach space theory, they shed his Fundamental Inequality in the trappings of operator ideals by shedding the tensorial formulation. The authors of this book, however, feel that there is much of value in Grothendieck's original formulations in the Resume and here endeavor to "expose the Resume" by presenting most of Grothendieck's arguments using the mathematical tools that were available to him at the time.

Capturing the state of the art of the interplay between positivity, noncommutative analysis, and related areas including partial differential equations, harmonic analysis, and operator theory, this volume was initiated on the occasion of the Delft conference in honour of Ben de Pagter's 65th birthday. It will be of interest to researchers in positivity, noncommutative analysis, and related fields. Contributions by Shavkat Ayupov, Amine Ben Amor, Karim Boulabiar, Qingying Bu, Gerard Buskes, Martijn Caspers, Jurie Conradie, Garth Dales, Marcel de Jeu, Peter Dodds, Theresa Dodds, Julio Flores, Jochen Glück, Jacobus Grobler, Wolter Groenevelt, Markus Haase, Klaas Pieter Hart, Francisco Hernández, Jamel Jaber, Rien Kaashoek, Turabay Kalandarov, Anke Kalauch, Arkady Kitover, Erik Koelink, Karimbergen Kudaybergenov, Louis Labuschagne, Yongjin Li, Nick Lindemulder, Emiel Lorist, Qi Lü, Miek Messerschmidt, Susumu Okada, Mehmet Orhon, Denis Potapov, Werner Ricker, Stephan Roberts, Pablo Román, Anton Schep, Claud Steyn, Fedor Sukochev, James Sweeney, Guido Sweers, Pedro Tradacete, Jan Harm van der Walt, Onno van Gaans, Jan van Neerven, Arnoud van Rooij, Freek van Schagen, Dominic Vella, Mark Veraar, Anthony Wickstead,

Marten Wortel, Ivan Yaroslavtsev, and Dmitriy Zanin.

In this book, non-spectral methods are presented and discussed that have been developed over the last two decades for the investigation of asymptotic behavior of operator semigroups. This concerns in particular Markov semigroups in L1-spaces, motivated by applications to probability theory and dynamical systems. Related results, historical notes, exercises, and open problems accompany each chapter.

Paul Turán, one of the greatest Hungarian mathematicians, was born 100 years ago, on August 18, 1910. To celebrate this occasion the Hungarian Academy of Sciences, the Alfréd Rényi Institute of Mathematics, the János Bolyai Mathematical Society and the Mathematical Institute of Eötvös Loránd University organized an international conference devoted to Paul Turán's main areas of interest: number theory, selected branches of analysis, and selected branches of combinatorics. The conference was held in Budapest, August 22-26, 2011. Some of the invited lectures reviewed different aspects of Paul Turán's work and influence. Most of the lectures allowed participants to report about their own work in the above mentioned areas of mathematics.

The study of composition operators links some of the most basic questions you can ask about linear operators with beautiful classical results from analytic-function theory. The process invests old theorems with new mean ings, and bestows upon functional analysis an intriguing class of concrete linear operators. Best of all, the subject can be appreciated by anyone with an interest in function theory or functional analysis, and a background roughly equivalent to the following twelve chapters of Rudin's textbook Real and Complex Analysis [Rdn '87]: Chapters 1-7 (measure and integra tion, LP spaces, basic Hilbert and Banach space theory), and 10-14

(basic function theory through the Riemann Mapping Theorem). In this book I introduce the reader to both the theory of composition operators, and the classical results that form its infrastructure. I develop the subject in a way that emphasizes its geometric content, staying as much as possible within the prerequisites set out in the twelve fundamental chapters of Rudin's book. Although much of the material on operators is quite recent, this book is not intended to be an exhaustive survey. It is, quite simply, an invitation to join in the fun. The story goes something like this.

This book offers a complete and streamlined treatment of the central principles of abelian harmonic analysis: Pontryagin duality, the Plancherel theorem and the Poisson summation formula, as well as their respective generalizations to non-abelian groups, including the Selberg trace formula. The principles are then applied to spectral analysis of Heisenberg manifolds and Riemann surfaces. This new edition contains a new chapter on p-adic and adelic groups, as well as a complementary section on direct and projective limits. Many of the supporting proofs have been revised and refined. The book is an excellent resource for graduate students who wish to learn and understand harmonic analysis and for researchers seeking to apply it.

This book presents the proceedings of Positivity VII, held from 22-26 July 2013, in Leiden, the Netherlands. Positivity is the mathematical field concerned with ordered structures and their applications in the broadest sense of the word. A biyearly series of conferences is devoted to presenting the latest developments in this lively and growing discipline. The lectures at the conference covered a broad spectrum of topics, ranging from order-theoretic approaches to stochastic processes, positive solutions of evolution equations and positive operators on vector

lattices, to order structures in the context of algebras of operators on Hilbert spaces. The contributions in the book reflect this variety and appeal to university researchers in functional analysis, operator theory, measure and integration theory and operator algebras. Positivity VII was also the Zaanen Centennial Conference to mark the 100th birth year of Adriaan Cornelis Zaanen, who held the chair of Analysis in Leiden for more than 25 years and was one of the leaders in the field during his lifetime.

This text was born out of an advanced mathematical economics seminar at Caltech in 1989-90. We realized that the typical graduate student in mathematical economics has to be familiar with a vast amount of material that spans several traditional fields in mathematics. Much of the mate rial appears only in esoteric research monographs that are designed for specialists, not for the sort of generalist that our students need be. We hope that in a small way this text will make the material here accessible to a much broader audience. While our motivation is to present and orga nize the analytical foundations underlying modern economics and finance, this is a book of mathematics, not of economics. We mention applications to economics but present very few of them. They are there to convince economists that the material has so me relevance and to let mathematicians know that there are areas of application for these results. We feel that this text could be used for a course in analysis that would benefit math ematicians, engineers, and scientists. Most of the material we present is available elsewhere, but is scattered throughout a variety of sources and occasionally buried in obscurity. Some of our results are original (or more likely, independent rediscoveries). We have included some material that we cannot honestly say is neces sary to understand modern economic theory, but may yet prove useful in future research.

Key definitions and results in symmetric spaces, particularly Lp, Lorentz, Marcinkiewicz and Orlicz spaces are emphasized in this textbook. A comprehensive overview of the Lorentz, Marcinkiewicz and Orlicz spaces is presented based on concepts and results of symmetric spaces. Scientists and researchers will find the application of linear operators, ergodic theory, harmonic analysis and mathematical physics noteworthy and useful. This book is intended for graduate students and researchers in mathematics and may be used as a general reference for the theory of functions, measure theory, and functional analysis. This self-contained text is presented in four parts totaling seventeen chapters to correspond with a one-semester lecture course. Each of the four parts begins with an overview and is subsequently divided into chapters, each of which concludes with exercises and notes. A chapter called “Complements” is included at the end of the text as supplementary material to assist students with independent work.

This book, along with its companion volume, Nonlinear Dynamics New Directions: Models and Applications, covers topics ranging from fractal analysis to very specific applications of the theory of dynamical systems to biology. This first volume is devoted to fundamental aspects and includes a number of important new contributions as well as some review articles that emphasize new development prospects. The second volume contains mostly new applications of the theory of dynamical systems to both engineering and biology. The topics addressed in the two volumes include a rigorous treatment of fluctuations in dynamical systems, topics in fractal analysis, studies of the transient dynamics in biological networks, synchronization in lasers, and control of chaotic systems, among others. This book also: · Presents a rigorous treatment of fluctuations in dynamical systems and explores a range of topics in fractal

analysis, among other fundamental topics · Features recent developments on large deviations for higher-dimensional maps, a study of measures resisting multifractal analysis and a overview of complex Kleninan groups · Includes thorough review of recent findings that emphasize new development prospects

p-adic numbers are of great theoretical importance in number theory, since they allow the use of the language of analysis to study problems relating toprime numbers and diophantine equations. Further, they offer a realm where one can do things that are very similar to classical analysis, but with results that are quite unusual. The book should be of use to students interested in number theory, but at the same time offers an interesting example of the many connections between different parts of mathematics. The book strives to be understandable to an undergraduate audience. Very little background has been assumed, and the presentation is leisurely. There are many problems, which should help readers who are working on their own (a large appendix with hints on the problem is included). Most of all, the book should offer undergraduates exposure to some interesting mathematics which is off the beaten track. Those who will later specialize in number theory, algebraic geometry, and related subjects will benefit more directly, but all mathematics students can enjoy the book.

This proceedings volume features selected contributions from the conference Positivity X. The field of positivity deals with ordered mathematical structures and their applications. At the biannual series of Positivity conferences, the latest developments in this diverse field are presented. The 2019 edition was no different, with lectures covering a broad spectrum of topics, including vector and Banach lattices and operators on such spaces, abstract stochastic processes in an ordered setting, the theory and applications of positive semi-groups to partial

differential equations, Hilbert geometries, positivity in Banach algebras and, in particular, operator algebras, as well as applications to mathematical economics and financial mathematics. The contributions in this book reflect the variety of topics discussed at the conference. They will be of interest to researchers in functional analysis, operator theory, measure and integration theory, operator algebras, and economics. Positivity X was dedicated to the memory of our late colleague and friend, Coenraad Labuschagne. His untimely death in 2018 came as an enormous shock to the Positivity community. He was a prominent figure in the Positivity community and was at the forefront of the recent development of abstract stochastic processes in a vector lattice context.

These four volumes (CCIS 297, 298, 299, 300) constitute the proceedings of the 14th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, IPMU 2012, held in Catania, Italy, in July 2012. The 258 revised full papers presented together with six invited talks were carefully reviewed and selected from numerous submissions. The papers are organized in topical sections on fuzzy machine learning and on-line modeling; computing with words and decision making; soft computing in computer vision; rough sets and complex data analysis: theory and applications; intelligent databases and information system; information fusion systems; philosophical and methodological aspects of soft computing; basic issues in rough sets; 40th anniversary of the measures of fuziness; SPS11 uncertainty in profiling systems and applications; handling uncertainty with copulas; formal methods to deal with uncertainty of many-valued events; linguistic summarization and description of data; fuzzy implications: theory and applications; sensing and data mining for teaching and learning; theory and applications of intuitionistic

fuzzy sets; approximate aspects of data mining and database analytics; fuzzy numbers and their applications; information processing and management of uncertainty in knowledge-based systems; aggregation functions; imprecise probabilities; probabilistic graphical models with imprecision: theory and applications; belief function theory: basics and/or applications; fuzzy uncertainty in economics and business; new trends in De Finetti's approach; fuzzy measures and integrals; multicriteria decision making; uncertainty in privacy and security; uncertainty in the spirit of Pietro Benvenuti; coopetition; game theory; probabilistic approach.

This concise text is based on a series of lectures held only a few years ago and originally intended as an introduction to known results on linear hyperbolic and parabolic equations. Yet the topic of differential equations on graphs, ramified spaces, and more general network-like objects has recently gained significant momentum and, well beyond the confines of mathematics, there is a lively interdisciplinary discourse on all aspects of so-called complex networks. Such network-like structures can be found in virtually all branches of science, engineering and the humanities, and future research thus calls for solid theoretical foundations. This book is specifically devoted to the study of evolution equations – i.e., of time-dependent differential equations such as the heat equation, the wave equation, or the Schrödinger equation (quantum graphs) – bearing in mind that the majority of the literature in the last ten years on the subject of differential equations of graphs has been devoted to elliptic equations and related spectral problems. Moreover, for tackling the most general settings - e.g. encoded in the transmission conditions in the network nodes - one classical and elegant tool is that of operator semigroups. This book is simultaneously a very concise introduction to this theory and a handbook on its applications to differential equations on networks. With a more

interdisciplinary readership in mind, full proofs of mathematical statements have been frequently omitted in favor of keeping the text as concise, fluid and self-contained as possible. In addition, a brief chapter devoted to the field of neurodynamics of the brain cortex provides a concrete link to ongoing applied research.

This volume is dedicated to A.C. Zaanen, one of the pioneers of functional analysis, and eminent expert in modern integration theory and the theory of vector lattices, on the occasion of his 80th birthday. The book opens with biographical notes, including Zaanen's curriculum vitae and list of publications. It contains a selection of original research papers which cover a broad spectrum of topics about operators and semigroups of operators on Banach lattices, analysis in function spaces and integration theory. Special attention is paid to the spectral theory of operators on Banach lattices; in particular, to the one of positive operators. Classes of integral operators arising in systems theory, optimization and best approximation problems, and evolution equations are also discussed. The book will appeal to a wide range of readers engaged in pure and applied mathematics.

This book presents nine survey articles addressing topics surrounding positivity, with an emphasis on functional analysis. The book assembles a wide spectrum of research into positivity, providing up-to-date information on topics of current interest. The discussion provides insight into classical areas like spaces of continuous functions, f-algebras, and integral operators. The coverage extends is broad, including vector measures, operator spaces, ordered tensor products, and non-commutative Banach function spaces.

Topics in Contemporary Mathematical Analysis and Applications encompasses several contemporary topics in the field of mathematical analysis, their applications, and relevancies in

other areas of research and study. The readers will find developments concerning the topics presented to a reasonable extent with various new problems for further study. Each chapter carefully presents the related problems and issues, methods of solutions, and their possible applications or relevancies in other scientific areas. Aims at enriching the understanding of methods, problems, and applications Offers an understanding of research problems by presenting the necessary developments in reasonable details Discusses applications and uses of operator theory, fixed-point theory, inequalities, bi-univalent functions, functional equations, and scalar-objective programming, and presents various associated problems and ways to solve such problems This book is written for individual researchers, educators, students, and department libraries.

This volume contains papers on semi-linear and quasi-linear elliptic equations from the workshop on Nonlinear Elliptic Partial Differential Equations, in honor of Jean-Pierre Gossez's 65th birthday, held September 2-4, 2009 at the Universite Libre de Bruxelles, Belgium. The workshop reflected Gossez's contributions in nonlinear elliptic PDEs and provided an opening to new directions in this very active research area. Presentations covered recent progress in Gossez's favorite topics, namely various problems related to the p-Laplacian operator, the antimaximum principle, the Fucik Spectrum, and other related subjects. This volume will be of principle interest to researchers in nonlinear analysis, especially in partial differential equations of elliptic type.

From the 28th of February through the 3rd of March, 2001, the Department of Math ematics of the University of Florida hosted a conference on the many

aspects of the field of Ordered Algebraic Structures. Officially, the title was "Conference on Lattice Ordered Groups and I-Rings", but its subject matter evolved beyond the limitations one might associate with such a label. This volume is officially the proceedings of that conference, although, likewise, it is more accurate to view it as a complement to that event. The conference was the fourth in wh at has turned into aseries of similar conferences, on Ordered Algebraic Structures, held in consecutive years. The first, held at the University of Florida in Spring, 1998, was a modest and informal affair. The fifth is in the final planning stages at this writing, for March 7-9, 2002, at Vanderbilt University. And although these events remain modest and reasonably informal, their scope has broadened, as they have succeeded in attracting mathematicians from other, related fields, as weIl as from more distant lands.

This is the first of two volumes dedicated to the centennial of the distinguished mathematician Selim Grigorievich Krein. The companion volume is Contemporary Mathematics, Volume 734. Krein was a major contributor to functional analysis, operator theory, partial differential equations, fluid dynamics, and other areas, and the author of several influential monographs in these areas. He was a prolific teacher, graduating 83 Ph.D. students. Krein also created and ran, for many years, the annual Voronezh Winter Mathematical Schools, which

significantly influenced mathematical life in the former Soviet Union. The articles contained in this volume are written by prominent mathematicians, former students and colleagues of Selim Krein, as well as lecturers and participants of Voronezh Winter Schools. They are devoted to a variety of contemporary problems in functional analysis, operator theory, several complex variables, topological dynamics, and algebraic, convex, and integral geometry.

The aim of this book is to present various facets of the theory and applications of Lipschitz functions, starting with classical and culminating with some recent results. Among the included topics we mention: characterizations of Lipschitz functions and relations with other classes of functions, extension results for Lipschitz functions and Lipschitz partitions of unity, Lipschitz free Banach spaces and their applications, compactness properties of Lipschitz operators, Bishop-Phelps type results for Lipschitz functionals, applications to best approximation in metric and in metric linear spaces, Kantorovich-Rubinstein norm and applications to duality in the optimal transport problem, Lipschitz mappings on geodesic spaces. The prerequisites are basic results in real analysis, functional analysis, measure theory (including vector measures) and topology, which, for reader's convenience, are surveyed in the first chapter of the book.

The book offers a direct and up-to-date introduction to the theory of one-

parameter semigroups of linear operators on Banach spaces. The book is intended for students and researchers who want to become acquainted with the concept of semigroups.