

Prediction Theory And Harmonic Analysis

The work of Lawrence Baggett has had a profound impact on the field of abstract harmonic analysis and the many areas of mathematics that use its techniques. His sphere of influence ranges from purely theoretical results regarding the representations of locally compact groups to recent applications of wavelets and frames to problems in sampling theory and image compression. Contributions in this volume reflect this broad scope, and Baggett's unusual ability to bring together techniques from disparate fields. Recent applications to problems in sampling theory and image compression are included. The chapters of this volume are based on talks given at the eleventh international Sampling Theory and Applications conference held in 2015 at American University in Washington, D.C. The papers highlight state-of-the-art advances and trends in sampling theory and related areas of application, such as signal and image processing. Chapters have been written by prominent mathematicians, applied scientists, and engineers with an expertise in sampling theory. Claude Shannon's 100th birthday is also celebrated, including an introductory essay that highlights Shannon's profound influence on the field. The topics covered include both theory and applications, such as:

- Compressed sensing
- Non-uniform and wave sampling
- A-to-D conversion
- Finite rate of innovation
- Time-frequency analysis
- Operator theory
- Mobile sampling issues

Sampling: Theory and Applications is ideal for mathematicians, engineers, and applied scientists working in sampling theory or related areas.

Since its emergence as an important research area in the early 1980s, the topic of wavelets has undergone tremendous development on both theoretical and applied fronts. Myriad research and survey papers and monographs have been published on the subject, documenting different areas of applications such as sound and image processing, denoising, data compression, tomography, and medical imaging. The study of wavelets remains a very active field of research, and many of its central techniques and ideas have evolved into new and promising research areas. This volume, a collection of invited contributions developed from talks at an international conference on wavelets, is divided into three parts: Part I is devoted to the mathematical theory of wavelets and features several papers on wavelet sets and the construction of wavelet bases in different settings. Part II looks at the use of multiscale harmonic analysis for understanding the geometry of large data sets and extracting information from them. Part III focuses on applications of wavelet theory to the study of several real-world problems. Overall, the book is an excellent reference for graduate students, researchers, and practitioners in theoretical and applied mathematics, or in engineering.

This textbook is a self-contained introduction to the abstract theory of bases and redundant frame expansions and their use in both applied and classical harmonic analysis. The four parts of the text take the reader from classical functional analysis and basis theory to modern time-frequency and wavelet theory. Extensive exercises complement the text and provide opportunities for learnings-by-doing, making the text suitable for graduate-level courses. The self-contained presentation with clear proofs is accessible to graduate students, pure and applied mathematicians, and engineers interested in the mathematical underpinnings of applications.

Adventures in Graph Theory

Proceedings of the Seventh International Conference on Ana-lysis and Optimization of Systems. Antibes, June 25-27, 1986

Advances in Microlocal and Time-Frequency Analysis

Recent Developments in Real and Harmonic Analysis

Finite Frames

Advances in Discrete Tomography and Its Applications

Celebrating Cora Sadosky's life

This contributed volume collects papers based on courses and talks given at the 2017 CIMPA school Harmonic Analysis, Geometric Measure Theory and Applications, which took place at the University of Buenos Aires in August 2017. These articles highlight recent breakthroughs in both harmonic analysis and geometric measure theory, particularly focusing on their impact on image and signal processing. The wide range of expertise present in these articles will help readers contextualize how these breakthroughs have been instrumental in resolving deep theoretical problems. Some topics covered include: Gabor frames Falconer distance problem Hausdorff dimension Sparse inequalities Fractional Brownian motion Fourier analysis in geometric measure theory This volume is ideal for applied and pure mathematicians interested in the areas of image and signal processing. Electrical engineers and statisticians studying these fields will also find this to be a valuable resource.

INRIA, Institut National de Recherche en Informatique et en Automatique

This book offers a unified presentation of Fourier theory and corresponding algorithms emerging from new developments in function approximation using Fourier methods. It starts with a detailed discussion of classical Fourier theory to enable readers to grasp the construction and analysis of advanced fast Fourier algorithms introduced in the second part, such as nonequispaced and sparse FFTs in higher dimensions. Lastly, it contains a selection of numerical applications, including recent research results on nonlinear function approximation by exponential sums. The code of most of the presented algorithms is available in the authors' public domain software packages. Students and researchers alike benefit from this unified presentation of Fourier theory and corresponding algorithms.

Marking a distinct departure from the perspectives of frame theory and discrete transforms, this book provides a comprehensive mathematical and algorithmic introduction to wavelet theory. As such, it can be used as either a textbook or reference guide. As a textbook for graduate mathematics students and beginning researchers, it offers detailed information on the basic theory of framelets and wavelets, complemented by self-contained elementary proofs, illustrative examples/figures, and supplementary exercises. Further, as an advanced reference guide for experienced researchers and practitioners in mathematics, physics, and engineering, the book addresses in detail a wide range of basic and advanced topics (such as multiwavelets/multiframelets in Sobolev spaces and directional framelets) in wavelet theory, together with systematic mathematical analysis, concrete algorithms, and recent developments in and applications of framelets and wavelets. Lastly, the book can also be used to teach on or study selected special topics in approximation theory, Fourier analysis, applied harmonic analysis, functional analysis, and wavelet-based signal/image processing.

A Basis Theory Primer

Landscapes of Time-Frequency Analysis

Celebrating Cora Sadosky's Life

Harmonic Analysis, Partial Differential Equations, Banach Spaces, and Operator Theory (Volume 2)

Excursions in Harmonic Analysis, Volume 2

Compressive Sensing and Other Developments

Analytic Methods and Modern Applications

Almost a century ago, harmonic analysis entered a (still continuing) Golden Age, with the emergence of many great masters throughout Europe. They created a wealth of profound analytic methods, to be successfully exploited and further developed by succeeding generations. This flourishing of harmonic analysis is today as lively as ever, as the papers presented here demonstrate. In addition to its own ongoing internal development and its basic role in other areas of mathematics, physics and chemistry, financial analysis, medicine, and biological signal processing, harmonic analysis has made fundamental contributions to essentially all twentieth century technology-based human endeavours, including telephone, radio, television, radar, sonar, satellite communications, medical imaging, the Internet, and multimedia. This ubiquitous nature of the subject is amply illustrated. The book not only promotes the infusion of new mathematical tools into applied harmonic analysis, but also to fuel the development of applied mathematics by providing opportunities for young engineers, mathematicians and other scientists to learn more about problem areas in today's technology that might benefit from new mathematical insights.

This contributed volume features chapters based on talks given at the second international conference titled Aspects of Time-Frequency Analysis (ATFA 19), held at Politecnico di Torino from June 25th to June 27th, 2019. Written by experts in harmonic analysis and its applications, these chapters provide a valuable overview of the state-of-the-art of this active area of research. New results are collected as well, making this a valuable resource for readers seeking to be brought up-to-date. Topics covered include: Signal analysis Quantum theory Modulation space theory Applications to the medical industry Wavelet transform theory Anti-Wick operators Landscapes of Time-Frequency Analysis: ATFA 2019 will be of particular interest to researchers and advanced students working in time-frequency analysis and other related areas of harmonic analysis.

Foundations of time series for researchers and students This volume provides a mathematical foundation for time seriesanalysis and prediction theory using the idea of regression and thegeometry of Hilbert spaces. It presents an overview of the tools oftime series data analysis, a detailed structural analysis ofstationary processes through various reparameterizations employingtechniques from prediction theory, digital signal processing, andlinear algebra. The author emphasizes the foundation and structureof time series and backs up this coverage with theory andapplication. End-of-chapter exercises provide reinforcement for self-study andappendices covering multivariate distributions and Bayesianforecasting add useful reference material. Further coveragefeatures: * Similarities between time series analysis and longitudinal dataanalysis * Parsimonious modeling of covariance matrices through ARMA-likemodels * Fundamental roles of the Wold decomposition andorthogonalization * Applications in digital signal processing and Kalmanfiltering * Review of functional and harmonic analysis and predictiontheory Foundations of Time Series Analysis and Prediction Theory guidesreaders from the very applied principles of time series analysissthrough the most theoretical underpinnings of prediction theory. Iprovides a firm foundation for a widely applicable subject forstudents, researchers, and professionals in diverse scientificfields.

This book has two main objectives, the first of which is to extend the power of numerical Fourier analysis and to show by means of theoretical examples and numerous concrete applications that when computing discrete Fourier transforms of periodic and non periodic functions, the usual kernel matrix of the Fourier transform, the discrete Fourier transform (DFT), should be replaced by another kernel matrix, the eXtended Fourier transform (XFT), since the XFT matrix appears as a convergent quadrature of a more general transform, the fractional Fourier transform. In turn, the book's second goal is to present the XFT matrix as a finite-dimensional transformation that links certain discrete operators in the same way that the corresponding continuous operators are related by the Fourier transform, and to show that the XFT matrix accordingly generates sequences of matrix operators that represent continuum operators, and which allow these operators to be studied from another perspective.

Expanded Edition

Twentieth Century Harmonic Analysis

Harmonic Analysis, Partial Differential Equations, Complex Analysis, Banach Spaces, and Operator Theory (Volume 1)

Wavelets and Multiscale Analysis

Fourier Analysis on Finite Abelian Groups

Realtime Data Mining

Four Short Courses on Harmonic Analysis

Functions of bounded variation represent an important class of functions. Studying their Fourier transforms is a valuable means of revealing their analytic properties. Moreover, it brings to light new interrelations between these functions and the real Hardy space and, correspondingly, between the Fourier transform and the Hilbert transform. This book is divided into two major parts, the first of which addresses several aspects of the behavior of the Fourier transform of a function of bounded variation in dimension one. In turn, the second part examines the Fourier transforms of multivariate functions with bounded Hardy variation. The results obtained are subsequently applicable to problems in approximation theory, summability of the Fourier series and integrability of trigonometric series.

The present volume gathers contributions to the conference Microlocal and Time-Frequency Analysis 2018 (MLTFA18), which was held at Torino University from the 2nd to the 6th of July 2018. The event was organized in honor of Professor Luigi Rodino on the occasion of his 70th birthday. The conference's focus and the contents of the papers reflect Luigi's various research interests in the course of his long and extremely prolific career at Torino University.

The book provides a unified presentation of new methods, algorithms, and select applications that are the foundations of multidimensional image construction and reconstruction. The self-contained survey chapters, written by leading mathematicians, engineers, and computer scientists, present cutting-edge research and results in the field. Three main areas are covered: theoretical results, algorithms, and practical applications. Following an historical and introductory overview of the field, the book explores the various mathematical and computational problems of discrete tomography with an emphasis on new applications.

The Norbert Wiener Center for Harmonic Analysis and Applications provides a state-of-the-art research venue for the broad emerging area of mathematical engineering in the context of harmonic analysis. This two-volume set consists of contributions from speakers at the February Fourier Talks (FFT) from 2006-2011. The FFT are organized by the Norbert Wiener Center in the Department of Mathematics at the University of Maryland, College Park. These volumes span a large spectrum of harmonic analysis and its applications. They are divided into the following parts: Volume I · Sampling Theory · Remote Sensing · Mathematics of Data Processing · Applications of Data Processing Volume II · Measure Theory · Filtering · Operator Theory · Biomathematics Each part provides state-of-the-art results, with contributions from an impressive array of mathematicians, engineers, and scientists in academia, industry, and government. Excursions in Harmonic Analysis: The February Fourier Talks at the Norbert Wiener Center is an excellent reference for graduate students, researchers, and professionals in pure and applied mathematics, engineering, and physics.

Harmonic Analysis

Harmonic and Applied Analysis

ATFA 2019

Representations, Wavelets, and Frames

Excursions in Harmonic Analysis, Volume 6

From Groups to Signals

The second of a two volume set on novel methods in harmonic analysis, this book draws on a number of original research and survey papers from well-known specialists detailing the latest innovations and recently discovered links between various fields. Along with many deep theoretical results, these volumes contain numerous applications to problems in signal processing, medical imaging, geodesy, statistics, and data science. The chapters within cover an impressive range of ideas from both traditional and modern harmonic analysis, such as: the Fourier transform, Shannon sampling, frames, wavelets, functions on Euclidean spaces, analysis on function spaces of Riemannian and sub-Riemannian manifolds, Fourier analysis on manifolds and Lie groups, analysis on combinatorial graphs, sheaves, co-sheaves, and persistent homologies on topological spaces. Volume II is organized around the theme of recent applications of harmonic analysis to function spaces, differential equations, and data science, covering topics such as: The classical Fourier transform, the non-linear Fourier transform (FBI transform), cardinal sampling series and translation invariant linear systems. Recent results concerning harmonic analysis on non-Euclidean spaces such as graphs and partially ordered sets. Applications of harmonic analysis to data science and statistics Boundary-value problems for PDE's including the Runge-Walsh theorem for the oblique derivative problem of physical geodesy.

This book is the second of a two volume series. Covering a range of subjects from operator theory and classical harmonic analysis to Banach space theory, this book features fully-refereed, high-quality papers exploring new results and trends in weighted norm inequalities, Schur-Agler class functions, complex analysis, dynamical systems, and dyadic harmonic analysis. Graduate students and researchers in analysis will find inspiration in the articles collected in this volume, which emphasize the remarkable connections between harmonic analysis and operator theory. A survey of the two weight problem for the Hilbert transform and an expository article on the Clark model to the case of non-singular measures and applications to the study of rank-one perturbations are included. The material for this volume is based on the 13th New Mexico Analysis Seminar held at the University of New Mexico, April 3-4, 2014 and on several special sections of the Western Spring Sectional Meeting at the University of New Mexico, April 4-6,2014. During the event, participants honored the memory of Cora Sadosky—a great mathematician who recently passed away and who made significant contributions to the field of harmonic analysis. Cora was an exceptional scientist and human being. She was a world expert in harmonic analysis and operator theory, publishing over fifty-five research papers and authoring a major textbook in the field. Participants of the conference include new and senior researchers, recent doctorates as well as leading experts in the area.

This unified, self-contained book examines the mathematical tools used for decomposing and analyzing functions, specifically, the application of the [discrete] Fourier transform to finite Abelian groups. With countless examples and unique exercise sets at the end of each section, Fourier Analysis on Finite Abelian Groups is a perfect companion to a first course in Fourier analysis. This text introduces mathematics students to subjects that are within their reach, but it also has powerful applications that may appeal to advanced researchers and mathematicians. The only prerequisites necessary are group theory, linear algebra, and complex analysis.

This contributed volume contains articles written by the plenary and invited speakers from the second international MATHEON Workshop 2015 that focus on applications of compressed sensing. Article authors address their techniques for solving the problems of compressed sensing, as well as connections to related areas like detecting community-like structures in graphs, curbatures on Grassmannians, and randomized tensor train singular value decompositions. Some of the novel applications covered include dimensionality reduction, information theory, random matrices, sparse approximation, and sparse recovery. This book is aimed at both graduate students and researchers in the areas of applied mathematics, computer science, and engineering, as well as other applied scientists exploring the potential applications for the novel methodology of compressed sensing. An introduction to the subject of compressed sensing is also provided for researchers interested in the field who are not as familiar with it.

Recent Applications of Harmonic Analysis to Function Spaces, Differential Equations, and Data Science

Prediction Theory and Harmonic Analysis

In Honor of John Benedetto's 80th Birthday

Excursions in Harmonic Analysis, Volume 1

Compressed Sensing and its Applications

Wiener's Contributions to Generalized Harmonic Analysis, Prediction Theory and Filter Theory

Sampling Theory, a Renaissance

Prediction Theory and Harmonic AnalysisThe Pesi Masani VolumeNorth HollandWiener's Contributions to Generalized Harmonic Analysis, Prediction Theory and Filter TheoryFoundations of Time Series Analysis and Prediction TheoryJohn Wiley & Sons

This textbook covers four research directions in harmonic analysis and presents some of its latest applications. It is the first work that combines spline theory, wavelets, frames, and time-frequency methods up to construction on manifolds other than Rn.

This textbook acts as a pathway to higher mathematics by seeking and illuminating the connections between graph theory and diverse fields of mathematics, such as calculus on manifolds, group theory, algebraic curves, Fourier analysis, cryptography and other areas of combinatorics. An overview of graph theory definitions and polynomial invariants for graphs prepares the reader for the subsequent dive into the applications of graph theory. To pique the reader's interest in areas of possible exploration, recent results in mathematics appear throughout the book, accompanied with examples of related graphs, how they arise, and what their valuable uses are. The consequences of graph theory covered by the authors are complicated and far-reaching, so topics are always exhibited in a user-friendly manner with copious graphs, exercises, and Sage code for the computation of equations. Samples of the book's source code can be found at github.com/springer-math/adventures-in-graph-theory. The text is geared towards advanced undergraduate and graduate students and is particularly useful for those trying to decide what type of problem to tackle for their dissertation. This book can also serve as a reference for anyone interested in exploring how they can apply graph theory to other parts of mathematics.

John J. Benedetto has had a profound influence not only on the direction of harmonic analysis and its applications, but also on the entire community of people involved in the field. The chapters in this volume – compiled on the occasion of his 80th birthday – are written by leading researchers in the field and pay tribute to John's many significant and lasting achievements. Covering a wide range of topics in harmonic analysis and related areas, these chapters are organized into four main parts: harmonic analysis, wavelets and frames, sampling and signal processing, and compressed sensing and optimization. An introductory chapter also provides a brief overview of John's life and mathematical career. This volume will be an excellent reference for graduate students, researchers, and professionals in pure and applied mathematics, engineering, and physics.

Norbert Wiener, 1894-1964

Harmonic Analysis, Geometric Measure Theory, and Applications

Framelets and Wavelets

Connected at infinity II: a selection of mathematics by Indians

The Pesi Masani Volume

In Honor of Carlos Segovia

New Trends in Applied Harmonic Analysis, Volume 2

Reconstructing or approximating objects from seemingly incomplete information is a frequent challenge in mathematics, science, and engineering. A multitude of tools designed to recover hidden information are based on Shannon's classical sampling theorem, a central pillar of Sampling Theory. The growing need to efficiently obtain precise and tailored digital representations of complex objects and phenomena requires the maturation of available tools in Sampling Theory as well as the development of complementary, novel mathematical theories. Today, research themes such as Compressed Sensing and Frame Theory re-energize the broad area of Sampling Theory. This volume illustrates the renaissance that the area of Sampling Theory is currently experiencing. It touches upon trendsetting areas such as Compressed Sensing, Finite Frames, Parametric Partial Differential Equations, Quantization, Finite Rate of Innovation, System Theory, as well as sampling in Geometry and Algebraic Topology.

This volume consists of contributions spanning a wide spectrum of harmonic analysis and its applications written by speakers at the February Fourier Talks from 2002 – 2013. Containing cutting-edge results by an impressive array of mathematicians, engineers, and scientists in academia, industry, and government, it will be an excellent reference for graduate students, researchers, and professionals in pure and applied mathematics, physics, and engineering. Topics covered include · spectral analysis and correlation; · radar and communications:

design, theory, and applications; · sparsity · special topics in harmonic analysis. The February Fourier Talks are held annually at the Norbert Wiener Center for Harmonic Analysis and Applications. Located at the University of Maryland, College Park, the Norbert Wiener Center provides a state-of- the-art research venue for the broad emerging area of mathematical engineering.

This edition of Volume 72, Number 1, Part II, January 1966, of the Bulletin is dedicated to the memory of Norbert Wiener.

Hilbert space frames have long served as a valuable tool for signal and image processing due to their resilience to additive noise, quantization, and erasures, as well as their ability to capture valuable signal characteristics. More recently, finite frame theory has grown into an important research topic in its own right, with a myriad of applications to pure and applied mathematics, engineering, computer science, and other areas. The number of research publications, conferences, and workshops on this topic has increased dramatically over the past few years, but no survey paper or monograph has yet appeared on the subject. Edited by two of the leading experts in the field, Finite Frames aims to fill this void in the literature by providing a comprehensive, systematic study of finite frame theory and applications. With carefully selected contributions written by highly experienced researchers, it covers topics including: * Finite Frame Constructions; * Optimal Erasure Resilient Frames; * Quantization of Finite Frames; * Finite Frames and Compressed Sensing; * Group and Gabor Frames; * Fusion Frames. Despite the variety of its chapters' source and content, the book's notation and terminology are unified throughout and provide a definitive picture of the current state of frame theory. With a broad range of applications and a clear, full presentation, this book is a highly valuable resource for graduate students and researchers across disciplines such as applied harmonic analysis, electrical engineering, quantum computing, medicine, and more. It is designed to be used as a supplemental textbook, self-study guide, or reference book.

Sampling: Theory and Applications

Foundations of Time Series Analysis and Prediction Theory

A Celebration of the Mathematical Work of Lawrence W. Baggett

Stochastic Models, Information Theory, and Lie Groups, Volume 2

The XFT Quadrature in Discrete Fourier Analysis

Wavelets, Frames, Time-Frequency Methods, and Applications to Signal and Image Analysis

Theory and Applications

This volume consists of contributions spanning a wide spectrum of harmonic analysis and its applications written by speakers at the February Fourier Talks from 2002 – 2016. Containing cutting-edge results by an impressive array of mathematicians, engineers, and scientists in academia, industry and government, it will be an excellent reference for graduate students, researchers, and professionals in pure and applied mathematics, physics, and engineering. Topics covered include: Theoretical harmonic analysis Image and signal processing Quantization Algorithms and representations The February Fourier Talks are held annually at the Norbert Wiener Center for Harmonic Analysis and Applications. Located at the University of Maryland, College Park, the Norbert Wiener Center provides a state-of- the-art research venue for the broad emerging area of mathematical engineering.

Harmonic Analysis is an important tool that plays a vital role in many areas of mathematics as well as applications. It studies functions by decomposing them into components that are special functions. A prime example is decomposing a periodic function into a linear combination of sines and cosines. The subject is vast, and this book covers only the selection of topics that was dealt with in the course given at the Courant Institute in 2000 and 2019. These include standard topics like Fourier series and Fourier transforms of functions, as well as issues of convergence of Abel, Feier, and Poisson sums. At a slightly more advanced level the book studies convolutions with singular integrals, fractional derivatives, Sobolev spaces, embedding theorems, Hardy spaces, and BMO. Applications to elliptic partial differential equations and prediction theory are explored. Some space is devoted to harmonic analysis on compact non-Abelian groups and their representations, including some details about two groups: the permutation group and SO(3). The text contains exercises at the end of most chapters and is suitable for advanced undergraduate students as well as first- or second-year graduate students specializing in the areas of analysis, PDE, probability or applied mathematics.

????Describing novel mathematical concepts for recommendation engines, Realtime Data Mining: Self-Learning Techniques for Recommendation Engines features a sound mathematical framework unifying approaches based on control and learning theories, tensor factorization, and hierarchical methods. Furthermore, it presents promising results of numerous experiments on real-world data.? The area of realtime data mining is currently developing at an exceptionally dynamic pace, and realtime data mining systems are the counterpart of today's "classic" data mining systems. Whereas the latter learn from historical data and then use it to deduce necessary actions, realtime analytics systems learn and act continuously and autonomously. In the vanguard of these new analytics systems are recommendation engines. They are principally found on the Internet, where all information is available in realtime and an immediate feedback is guaranteed. This monograph appeals to computer scientists and specialists in machine learning, especially from the area of recommender systems, because it conveys a new way of realtime thinking by considering recommendation tasks as control-theoretic problems. Realtime Data Mining: Self-Learning Techniques for Recommendation Engines will also interest application-oriented mathematicians because it consistently combines some of the most promising mathematical areas, namely control theory, multilevel approximation, and tensor factorization.

This volume consists of contributions spanning a wide spectrum of harmonic analysis and its applications written by speakers at the February Fourier Talks from 2002 – 2013. Containing cutting-edge results by an impressive array of mathematicians, engineers and scientists in academia, industry and government, it will be an excellent reference for graduate students, researchers and professionals in pure and applied mathematics, physics and engineering. Topics covered include: Special Topics in Harmonic Analysis Applications and Algorithms in the Physical Sciences Gabor Theory RADAR and Communications: Design, Theory, and Applications The February Fourier Talks are held annually at the Norbert Wiener Center for Harmonic Analysis and Applications. Located at the University of Maryland, College Park, the Norbert Wiener Center provides a state-of- the-art research venue for the broad emerging area of mathematical engineering.

Excursions in Harmonic Analysis, Volume 4

Functions of Bounded Variation and Their Fourier Transforms

A Centennial Celebration of Claude Shannon

Harmonic Analysis of Operators on Hilbert Space

A Celebration

The February Fourier Talks at the Norbert Wiener Center

Excursions in Harmonic Analysis, Volume 3

This two-volume set covers stochastic processes, information theory and Lie groups in a unified setting, bridging topics rarely studied together. The emphasis is on using stochastic, geometric, and group-theoretic concepts for modeling physical phenomena.

Covering a range of subjects from operator theory and classical harmonic analysis to Banach space theory, this book contains survey and expository articles by leading experts in their corresponding fields, and features fully-refereed, high-quality papers exploring new results and trends in spectral theory, mathematical physics, geometric function theory, and partial differential equations. Graduate students and researchers in analysis will find inspiration in the articles collected in this volume, which emphasize the remarkable connections between harmonic analysis and operator theory. Another shared research interest of the contributors of this volume lies in the area of applied harmonic analysis, where a new notion called chromatic derivatives has recently been introduced in communication engineering. The material for this volume is based on the 13th New Mexico Analysis Seminar held at the University of New Mexico, April 3-4, 2014 and on several special sections of the Western Spring Sectional Meeting at the University of New Mexico, April 4-6, 2014. During the event, participants honored the memory of Cora Sadosky—a great mathematician who recently passed away and who made significant contributions to the field of harmonic analysis. Cora was an exceptional mathematician and human being. She was a world expert in harmonic analysis and operator theory, publishing over fifty-five research papers and authoring a major textbook in the field. Participants of the conference include new and senior researchers, recent doctorates as well as leading experts in the area.

The existence of unitary dilations makes it possible to study arbitrary contractions on a Hilbert space using the tools of harmonic analysis. The first edition of this book was an account of the progress done in this direction in 1950-70. Since then, this work has influenced many other areas of mathematics, most notably interpolation theory and control theory. This second edition, in addition to revising and amending the original text, focuses on further developments of the theory, including the study of two operator classes: operators whose powers do not converge strongly to zero, and operators whose functional calculus (as introduced in Chapter III) is not injective. For both of these classes, a wealth of material on structure, classification and invariant subspaces is included in Chapters IX and X. Several chapters conclude with a sketch of other developments related with (and developing) the material of the first edition.

A collection of invited chapters dedicated to Carlos Segovia, this unified and self-contained volume examines recent developments in real and harmonic analysis. The work begins with a chronological description of Segovia's mathematical life, highlighting his original ideas and their evolution. Also included are surveys dealing with Carlos' favorite topics, and PDE works written by students and colleagues close to Segovia whose careers were in some way influenced by him. Contributors: H. Aimar, A. Bonami, O. Blasco, L.A. Caffarelli, S. Chanillo, J. Feuto, L. Forzani, C.E. Gutierrez, E. Harboure, A.L. Karakhanyan, C.E. Kenig, R.A. Macías, J.J. Manfredi, F.J. Martín-Reyes, P. Ortega, R. Scotto, A. de la Torre, J.L. Torrea.

Numerical Fourier Analysis

Analysis and Optimization of Systems

Novel Methods in Harmonic Analysis, Volume 2

Second International MATHEON Conference 2015

Excursions in Harmonic Analysis, Volume 5

Algorithms, Analysis, and Applications

Self-Learning Techniques for Recommendation Engines

This contributed volume explores the connection between the theoretical aspects of harmonic analysis and the construction of advanced multiscale representations that have emerged in signal and image processing. It highlights some of the most promising mathematical developments in harmonic analysis in the last decade brought about by the interplay among different areas of abstract and applied mathematics. This intertwining of ideas is considered starting from the theory of unitary group representations and leading to the construction of very efficient schemes for the analysis of multidimensional data. After an introductory chapter surveying the scientific significance of classical and more advanced multiscale methods, chapters cover such topics as An overview of Lie theory focused on common applications in signal analysis, including the wavelet representation of the affine group, the Schrödinger representation of the Heisenberg group, and the metaplectic representation of the symplectic group An introduction to coorbit theory and how it can be combined with the shearlet transform to establish shearlet coorbit spaces Microlocal properties of the shearlet transform and its ability to provide a precise geometric characterization of edges and interface boundaries in images and other multidimensional data Mathematical techniques to construct optimal data representations for a number of signal types, with a focus on the optimal approximation of functions governed by anisotropic singularities. A unified notation is used across all of the chapters to ensure consistency of the mathematical material presented. Harmonic and Applied Analysis: From Groups to Signals is aimed at graduate students and researchers in the areas of harmonic analysis and applied mathematics, as well as at other applied scientists interested in representations of multidimensional data. It can also be used as a textbook for graduate courses in applied harmonic analysis.