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KEY=CONTEXTS - STEVENS DEVAN

Elementary Theory

Fundamentals of the Theory of Operator Algebras

Elsevier *Fundamentals of the Theory of Operator Algebras, Volume I: Elementary Theory provides information pertinent to the fundamental aspects of the theory of operator algebras. This book discusses the finite-dimensional linear algebra. Organized into five chapters, this volume begins with an overview of the fundamental aspects of linear functional analysis that are needed in the study of operator algebras. This text then discusses the continuous linear operators, continuous linear functionals, weak topologies, and convexity in the context of linear topological spaces. Other chapters consider the elementary geometry of Hilbertspaces and the simplest properties of Hilbert space operators. This book discusses as well algebras that have a Banach-space structure relative to which the multiplication is continuous. The final chapter deals with those C*-algebras that are strong-operator closed in their action on some Hilbert space, which play a fundamental role in the subject. This book is a valuable resource for mathematicians.*

Linear Algebra

A First Course with Applications to Differential Equations

John Wiley & Sons *Developed from the author's successful two-volume Calculus text this book presents Linear Algebra without emphasis on abstraction or formalization. To accommodate a variety of backgrounds, the text begins with a review of prerequisites divided into precalculus and calculus prerequisites. It continues to cover vector algebra, analytic geometry, linear spaces, determinants, linear differential equations and more.*

Indefinite Inner Product Spaces

Springer Science & Business Media *By definition, an indefinite inner product space is a real or complex vector space together with a symmetric (in the complex case: hermi tian) bilinear form prescribed on it so that the corresponding quadratic form assumes both positive and negative values. The most important special case arises when a Hilbert space is considered as an orthogonal direct sum of two subspaces, one equipped with the original inner prod uct, and the other with -1 times the original inner product. The subject first appeared thirty years ago in a paper of Dirac [1] on quantum field theory (d. also Pauli [lJ). Soon afterwards, Pontrja gin [1] gave the first mathematical treatment of an indefinite inner prod uct space. Pontrjagin was unaware of the investigations of Dirac and Pauli; on the other hand, he was inspired by a work of Sobolev [lJ, unpublished up to 1960, concerning a problem of mechanics. The attempts of Dirac and Pauli to apply the concept and elemen tary properties of indefinite inner product spaces to field theory have been renewed by several authors. At present it is not easy to judge which of their results will contribute to the final form of this part of physics. The following list of references should serve as a guide to the extensive literature: Bleuler [1], Gupta [lJ, Kallen and Pauli [lJ, Heisen berg [lJ-[4J, Bogoljubov, Medvedev and Polivanov [lJ, K.L. Nagy [lJ-[3], Berezin [lJ, Arons, Han and Sudarshan [1], Lee and Wick [1J.*

Functional Analysis

New Age International *The Book Is Intended To Serve As A Textbook For An Introductory Course In Functional Analysis For The Senior Undergraduate And Graduate Students. It Can Also Be Useful For The Senior Students Of Applied Mathematics, Statistics, Operations Research, Engineering And Theoretical Physics. The Text Starts With A Chapter On Preliminaries Discussing Basic Concepts And Results Which Would Be Taken For Granted Later In The Book. This Is Followed By Chapters On Normed And Banach Spaces, Bounded Linear Operators, Bounded Linear Functionals. The Concept And Specific Geometry Of Hilbert Spaces, Functionals And Operators On Hilbert Spaces And Introduction To Spectral Theory. An Appendix Has Been Given On Schauder Bases.The Salient Features Of The Book Are: * Presentation Of The Subject In A Natural Way * Description Of The Concepts With Justification * Clear And Precise Exposition Avoiding Pendantry * Various Examples And Counter Examples * Graded Problems Throughout Each ChapterNotes And Remarks Within The Text Enhances The Utility Of The Book For The Students.*

Photons in Fock Space and Beyond

(In 3 Volumes)

World Scientific *The three-volume major reference “Photons in Fock Space and Beyond” undertakes a new mathematical and conceptual foundation of the theory of light emphasizing mesoscopic radiation systems. The quantum optical notions are generalized beyond Fock representations where the richness of an infinite dimensional quantum field system, with its mathematical difficulties and theoretical possibilities, is fully taken into account. It aims at a microscopic formulation of a mesoscopic model class which covers in principle all stages of the generation and propagation of light within a unified and well-defined conceptual frame. The dynamics of the interacting systems is founded — according to original works of the authors — on convergent perturbation series and describes the developments of the quantized microscopic as well as the classical collective degrees of freedom at the same time. The achieved theoretical unification fits especially to laser and microwave applications inheriting objective information over quantum noise. A special advancement is the incorporation of arbitrary multiply connected cavities where ideal conductor boundary conditions are imposed. From there arises a new category of classical and quantized field parts, apparently not treated in Quantum Electrodynamics before. In combination with gauge theory, the additional “cohomological fields” explain topological quantum effects in*

superconductivity. Further applications are to be expected for optoelectronic and optomechanical systems. Contents:Volume I: From Classical to Quantized Radiation Systems:Preliminaries on ElectromagnetismClassical Electrodynamics in L2-Hilbert SpacesClassical Electrodynamics in the Smeared Field FormalismStatistical Classical ElectrodynamicsCanonical Quantization and Weyl AlgebrasDeformation QuantizationOptical States, Optical CoherenceVolume II: Quantized Mesoscopic Radiation Models:SqueezingBlack Body RadiationMesoscopic Electronic Matter Algebras and StatesWeakly Inhomogeneous InteractionsQuantized Radiation ModelsVolume III: Mathematics for Photon Fields:Observables and AlgebrasStates and Their Decomposition MeasuresDynamics and Perturbation TheoryGauges and Fiber Bundles Readership: This three-volume series is recommended for graduate students and researchers working in rigorous Electrodynamics, Quantum Optics and Quantum Field Theory in general. Key Features:On the side of Physics, “Photons in Fock Space and Beyond” extends the applicability of quantum optical notions far beyond the usual scope of the quantum optical literature by using more general optical cavities and theoretical ansatzes. By establishing a systematic conceptual frame, many fundamental questions of photon theory are clarified by mathematical argumentsOn the side of Mathematical Physics, certain parts of the theory of vector fields with boundary conditions, of operator algebras, ergodic theory, convexity, measures on dual spaces, perturbation theory and electrodynamic gauge bundles are not only treated in an introductory fashion but also supplemented in an original mannerThe unique feature of that exposition of mathematical disciplines is their integration into a comprehesive line of thought within a deductive physical theoryKeywords:Electrodynamics;Vector Analysis;Statistical Physics;Quantum Optics;Quantum Field Theory;Quantum Statistics;Solid State Physics;Superconductivity;Gauge Theory;Operator Algebras;Convexity;Topological Vector Spaces;Fiber BundlesReviews: “This three volume work on the quantum field theory of radiation combines well presented, competent mathematical foundations with actual physical applications to mesoscopic photonics.” (See Full Review) Professor Ernst Binz Universität Mannheim

Several Real Variables

Springer *This undergraduate textbook is based on lectures given by the author on the differential and integral calculus of functions of several real variables. The book has a modern approach and includes topics such as: •The p-norms on vector space and their equivalence •The Weierstrass and Stone-Weierstrass approximation theorems •The differential as a linear functional; Jacobians, Hessians, and Taylor's theorem in several variables •The Implicit Function Theorem for a system of equations, proved via Banach’s Fixed Point Theorem •Applications to Ordinary Differential Equations •Line integrals and an introduction to surface integrals This book features numerous examples, detailed proofs, as well as exercises at the end of sections. Many of the exercises have detailed solutions, making the book suitable for self-study. Several Real Variables will be useful for undergraduate students in mathematics*

who have completed first courses in linear algebra and analysis of one real variable.

Mathematical Principles of the Internet, Two Volume Set

CRC Press *This two-volume set on Mathematical Principles of the Internet provides a comprehensive overview of the mathematical principles of Internet engineering. The books do not aim to provide all of the mathematical foundations upon which the Internet is based. Instead, these cover only a partial panorama and the key principles. Volume 1 explores Internet engineering, while the supporting mathematics is covered in Volume 2. The chapters on mathematics complement those on the engineering episodes, and an effort has been made to make this work succinct, yet self-contained. Elements of information theory, algebraic coding theory, cryptography, Internet traffic, dynamics and control of Internet congestion, and queueing theory are discussed. In addition, stochastic networks, graph-theoretic algorithms, application of game theory to the Internet, Internet economics, data mining and knowledge discovery, and quantum computation, communication, and cryptography are also discussed. In order to study the structure and function of the Internet, only a basic knowledge of number theory, abstract algebra, matrices and determinants, graph theory, geometry, analysis, optimization theory, probability theory, and stochastic processes, is required. These mathematical disciplines are defined and developed in the books to the extent that is needed to develop and justify their application to Internet engineering.*

Advanced Engineering Mathematics

Jones & Bartlett Publishers *Now with a full-color design, the new Fourth Edition of Zill's Advanced Engineering Mathematics provides an in-depth overview of the many mathematical topics necessary for students planning a career in engineering or the sciences. A key strength of this text is Zill's emphasis on differential equations as mathematical models, discussing the constructs and pitfalls of each. The Fourth Edition is comprehensive, yet flexible, to meet the unique needs of various course offerings ranging from ordinary differential equations to vector calculus. Numerous new projects contributed by esteemed mathematicians have been added. New modern applications and engaging projects makes Zill's classic text a must-have text and resource for Engineering Math students!*

The Foundations of Mechanics and Thermodynamics

Selected Papers

Springer Science & Business Media *German scholars, against odds now not only forgotten but also hard to imagine, were striving to revivify the life of the mind which the mental and physical barbarity preached and practised by the -isms and -acies of 1933-1946 had all but eradicated. Thinking that among the disciples of these elders, restorers rather than progressives, I might find a student or two who would wish to master new mathematics but grasp it and use it with the wholeness of earlier times, in 1952 I wrote to Mr. HAMEL, one of the few then remaining mathematicians from the classical mould, to ask him to name some young men fit to study for the doc torate in The Graduate Institute for Applied Mathematics at Indiana University, flourishing at that time though soon to be destroyed by the jealous ambition of the local, stereotyped pure. Having just retired from the Technische Universitat in Charlottenburg, he passed my inquiry on to Mr. SZABO, in whose institute there NOLL was then an assistant. Although Mr.*

Solutions to Abstract Algebra

Firewall Media

An Introduction to Computational Stochastic PDEs

Cambridge University Press *This book gives a comprehensive introduction to numerical methods and analysis of stochastic processes, random fields and stochastic differential equations, and offers graduate students and researchers powerful tools for understanding uncertainty quantification for risk analysis. Coverage includes traditional stochastic ODEs with white noise forcing, strong and weak approximation, and the multi-level Monte Carlo method. Later chapters apply the theory of random fields to the numerical solution of elliptic PDEs with correlated random data, discuss the Monte Carlo method, and introduce stochastic Galerkin finite-element methods. Finally, stochastic parabolic PDEs are developed. Assuming little previous exposure to probability and statistics, theory is developed in tandem with state-of-the-art computational methods through worked examples, exercises, theorems and proofs. The set of MATLAB codes included (and downloadable) allows readers to perform computations themselves and solve the test problems discussed. Practical examples are drawn from finance, mathematical biology, neuroscience, fluid flow modelling and materials science.*

A Primer on Hilbert Space Theory

Linear Spaces, Topological Spaces, Metric Spaces, Normed Spaces, and Topological Groups

Springer Nature *This book offers an essential introduction to the theory of Hilbert space, a fundamental tool for non-relativistic quantum mechanics. Linear, topological, metric, and normed spaces are all addressed in detail, in a rigorous but reader-friendly fashion. The rationale for providing an introduction to the theory of Hilbert space, rather than a detailed study of Hilbert space theory itself, lies in the strenuous mathematics demands that even the simplest physical cases entail. Graduate courses in physics rarely offer enough time to cover the theory of Hilbert space and operators, as well as distribution theory, with sufficient mathematical rigor. Accordingly, compromises must be found between full rigor and the practical use of the instruments. Based on one of the authors's lectures on functional analysis for graduate students in physics, the book will equip readers to approach Hilbert space and, subsequently, rigged Hilbert space, with a more practical attitude. It also includes a brief introduction to topological groups, and to other mathematical structures akin to Hilbert space. Exercises and solved problems accompany the main text, offering readers opportunities to deepen their understanding. The topics and their presentation have been chosen with the goal of quickly, yet rigorously and effectively, preparing readers for the intricacies of Hilbert space. Consequently, some topics, e.g., the Lebesgue integral, are treated in a somewhat unorthodox manner. The book is ideally suited for use in upper undergraduate and lower graduate courses, both in Physics and in Mathematics.*

Handbook of Differential Geometry

Elsevier *In the series of volumes which together will constitute the Handbook of Differential Geometry a rather complete survey of the field of differential geometry is given. The different chapters will both deal with the basic material of differential geometry and with research results (old and recent). All chapters are written by experts in the area and contain a large bibliography.*

Operator Theory and Indefinite Inner Product Spaces

Presented on the Occasion of the Retirement of Heinz Langer in the Colloquium on Operator Theory, Vienna, March 2004

Springer Science & Business Media *A colloquium on operator theory was held in Vienna, Austria, in March 2004, on the occasion of the retirement of Heinz Langer, a leading expert in operator theory and indefinite inner product spaces. The book contains fifteen refereed articles reporting on recent and original results in various areas of operator theory, all of them related with the work of Heinz Langer. The topics range from abstract spectral theory in Krein spaces to more concrete applications, such as boundary value problems, the study of orthogonal functions, or moment problems. The book closes with a historical survey paper.*

A Second Course in Linear Algebra

Cambridge University Press *A second course in linear algebra for undergraduates in mathematics, computer science, physics, statistics, and the biological sciences.*

Lectures on Quantum Mechanics

Second Edition

World Scientific Publishing Company *This set of lecture notes on quantum mechanics aims to teach, in a simple and straightforward manner, the basic theory behind the subject, drawing on examples from all fields of physics to provide both background as well as context. The self-contained book includes a review of classical mechanics and some of the necessary mathematics. Both the standard*

fare of quantum mechanics texts — the harmonic oscillator, the hydrogen atom, angular momentum as well as topics such as symmetry with a discussion on periodic potentials, the relativistic electron, spin and scattering theory are covered. Approximation methods are discussed with a view to applications; these include stationary perturbation theory, the WKB approximation, time dependent perturbations and the variational principle. Together, the seventeen chapters provide a very comprehensive introduction to quantum mechanics. Selected problems are collected at the end of each chapter in addition to the numerous exercises sprinkled throughout the text. The book is written in a simple and elegant style, and is characterized by clarity, depth and excellent pedagogical organization.

Alternating Projection Methods

SIAM *A comprehensive textbook for advanced undergraduate or graduate students.*

Introduction to Abstract Algebra

From Rings, Numbers, Groups, and Fields to Polynomials and Galois Theory

JHU Press *Presents a systematic approach to one of math's most intimidating concepts. Avoiding the pitfalls common in the standard textbooks, this title begins with familiar topics such as rings, numbers, and groups before introducing more difficult concepts.*

Vectors, Pure and Applied

A General Introduction to Linear Algebra

Cambridge University Press *Many books in linear algebra focus purely on getting students through exams, but this text explains both the how and the why of linear algebra and enables students to begin thinking like mathematicians. The author demonstrates how different topics (geometry, abstract algebra, numerical analysis, physics) make use of vectors in different ways and how these ways*

are connected, preparing students for further work in these areas. The book is packed with hundreds of exercises ranging from the routine to the challenging. Sketch solutions of the easier exercises are available online.

Geometry of Linear 2-normed Spaces

Nova Publishers

Mathematical Handbook for Scientists and Engineers

Definitions, Theorems, and Formulas for Reference and Review

Courier Corporation *Convenient access to information from every area of mathematics: Fourier transforms, Z transforms, linear and nonlinear programming, calculus of variations, random-process theory, special functions, combinatorial analysis, game theory, much more.*

Uncertainty Quantification in Variational Inequalities

Theory, Numerics, and Applications

CRC Press *Uncertainty Quantification (UQ) is an emerging and extremely active research discipline which aims to quantitatively treat any uncertainty in applied models. The primary objective of Uncertainty Quantification in Variational Inequalities: Theory, Numerics, and Applications is to present a comprehensive treatment of UQ in variational inequalities and some of its generalizations emerging from various network, economic, and engineering models. Some of the developed techniques also apply to machine learning, neural networks, and related fields. Features First book on UQ in variational inequalities emerging from various network, economic, and engineering models Completely self-contained and lucid in style Aimed for a diverse audience including applied mathematicians, engineers, economists, and professionals from academia Includes the most recent developments on the subject which so far have*

only been available in the research literature

Classical Geometries in Modern Contexts

Mathematical Analysis

A Concise Introduction

John Wiley & Sons *A self-contained introduction to the fundamentals of mathematical analysis Mathematical Analysis: A Concise Introduction presents the foundations of analysis and illustrates its role in mathematics. By focusing on the essentials, reinforcing learning through exercises, and featuring a unique "learn by doing" approach, the book develops the reader's proof writing skills and establishes fundamental comprehension of analysis that is essential for further exploration of pure and applied mathematics. This book is directly applicable to areas such as differential equations, probability theory, numerical analysis, differential geometry, and functional analysis. Mathematical Analysis is composed of three parts: ?Part One presents the analysis of functions of one variable, including sequences, continuity, differentiation, Riemann integration, series, and the Lebesgue integral. A detailed explanation of proof writing is provided with specific attention devoted to standard proof techniques. To facilitate an efficient transition to more abstract settings, the results for single variable functions are proved using methods that translate to metric spaces. ?Part Two explores the more abstract counterparts of the concepts outlined earlier in the text. The reader is introduced to the fundamental spaces of analysis, including Lp spaces, and the book successfully details how appropriate definitions of integration, continuity, and differentiation lead to a powerful and widely applicable foundation for further study of applied mathematics. The interrelation between measure theory, topology, and differentiation is then examined in the proof of the Multidimensional Substitution Formula. Further areas of coverage in this section include manifolds, Stokes' Theorem, Hilbert spaces, the convergence of Fourier series, and Riesz' Representation Theorem. ?Part Three provides an overview of the motivations for analysis as well as its applications in various subjects. A special focus on ordinary and partial differential equations presents some theoretical and practical challenges that exist in these areas. Topical coverage includes Navier-Stokes equations and the finite element method. Mathematical Analysis: A Concise Introduction includes an extensive index and over 900 exercises ranging in level of difficulty, from conceptual questions and adaptations of proofs to proofs with and without hints. These opportunities for reinforcement, along with the overall concise and well-*

organized treatment of analysis, make this book essential for readers in upper-undergraduate or beginning graduate mathematics courses who would like to build a solid foundation in analysis for further work in all analysis-based branches of mathematics.

Wavelets, Their Friends, and what They Can Do for You

European Mathematical Society *These notes introduce the central concepts surrounding wavelets and their applications. By focusing on the essential ideas and arguments, the authors enable readers to get to the heart of the matter as quickly as possible. A list of references guides readers interested in further study to the appropriate places in the literature for detailed proofs and real applications. The authors begin with the notion of time-frequency analysis, present the multiresolution analysis and basic wavelet construction, introduce the many friends, relatives, and mutations of wavelets, and finally give a selection of applications. This book is suitable for beginning graduate students and above. A preliminary chapter containing some of the prerequisite concepts and definitions is included for reference.*

Fundamentals of Continuum Mechanics

With Applications to Mechanical, Thermomechanical, and Smart Materials

Academic Press *Fundamentals of Continuum Mechanics provides a clear and rigorous presentation of continuum mechanics for engineers, physicists, applied mathematicians, and materials scientists. This book emphasizes the role of thermodynamics in constitutive modeling, with detailed application to nonlinear elastic solids, viscous fluids, and modern smart materials. While emphasizing advanced material modeling, special attention is also devoted to developing novel theories for incompressible and thermally expanding materials. A wealth of carefully chosen examples and exercises illuminate the subject matter and facilitate self-study. Uses direct notation for a clear and straightforward presentation of the mathematics, leading to a better understanding of the underlying physics Covers high-interest research areas such as small- and large-deformation continuum electrodynamics, with application to smart materials used in intelligent systems and structures Offers a unique approach to modeling incompressibility and thermal expansion, based on the authors' own research*

Basic Operator Theory

Birkhäuser *rii application of linear operators on a Hilbert space. We begin with a chapter on the geometry of Hilbert space and then proceed to the spectral theory of compact self adjoint operators; operational calculus is next presented as a nat ural outgrowth of the spectral theory. The second part of the text concentrates on Banach spaces and linear operators acting on these spaces. It includes, for example, the three 'basic principles of linear analysis and the Riesz Fredholm theory of compact operators. Both parts contain plenty of applications. All chapters deal exclusively with linear problems, except for the last chapter which is an introduction to the theory of nonlinear operators. In addition to the standard topics in functional anal ysis, we have presented relatively recent results which appear, for example, in Chapter VII. In general, in writ ing this book, the authors were strongly influenced by re cent developments in operator theory which affected the choice of topics, proofs and exercises. One of the main features of this book is the large number of new exercises chosen to expand the reader's com prehension of the material, and to train him or her in the use of it. In the beginning portion of the book we offer a large selection of computational exercises; later, the proportion of exercises dealing with theoretical questions increases. We have, however, omitted exercises after Chap ters V, VII and XII due to the specialized nature of the subject matter.*

Introduction to Real Analysis

Springer *Developed over years of classroom use, this textbook provides a clear and accessible approach to real analysis. This modern interpretation is based on the author’s lecture notes and has been meticulously tailored to motivate students and inspire readers to explore the material, and to continue exploring even after they have finished the book. The definitions, theorems, and proofs contained within are presented with mathematical rigor, but conveyed in an accessible manner and with language and motivation meant for students who have not taken a previous course on this subject. The text covers all of the topics essential for an introductory course, including Lebesgue measure, measurable functions, Lebesgue integrals, differentiation, absolute continuity, Banach and Hilbert spaces, and more. Throughout each chapter, challenging exercises are presented, and the end of each section includes additional problems. Such an inclusive approach creates an abundance of opportunities for readers to develop their understanding, and aids instructors as they plan their coursework. Additional resources are available online, including expanded chapters, enrichment exercises, a detailed course outline, and much more. Introduction to Real Analysis is intended for first-year graduate students taking a first course in real analysis, as well as for instructors seeking detailed lecture material with structure and accessibility in mind.*

Additionally, its content is appropriate for Ph.D. students in any scientific or engineering discipline who have taken a standard upper-level undergraduate real analysis course.

Finite Dimensional Vector Spaces. (AM-7), Volume 7

Princeton University Press *As a newly minted Ph.D., Paul Halmos came to the Institute for Advanced Study in 1938--even though he did not have a fellowship--to study among the many giants of mathematics who had recently joined the faculty. He eventually became John von Neumann's research assistant, and it was one of von Neumann's inspiring lectures that spurred Halmos to write Finite Dimensional Vector Spaces. The book brought him instant fame as an expositor of mathematics. Finite Dimensional Vector Spaces combines algebra and geometry to discuss the three-dimensional area where vectors can be plotted. The book broke ground as the first formal introduction to linear algebra, a branch of modern mathematics that studies vectors and vector spaces. The book continues to exert its influence sixty years after publication, as linear algebra is now widely used, not only in mathematics but also in the natural and social sciences, for studying such subjects as weather problems, traffic flow, electronic circuits, and population genetics. In 1983 Halmos received the coveted Steele Prize for exposition from the American Mathematical Society for "his many graduate texts in mathematics dealing with finite dimensional vector spaces, measure theory, ergodic theory, and Hilbert space."*

Digital Signal Processing with Kernel Methods

John Wiley & Sons *A realistic and comprehensive review of joint approaches to machine learning and signal processing algorithms, with application to communications, multimedia, and biomedical engineering systems Digital Signal Processing with Kernel Methods reviews the milestones in the mixing of classical digital signal processing models and advanced kernel machines statistical learning tools. It explains the fundamental concepts from both fields of machine learning and signal processing so that readers can quickly get up to speed in order to begin developing the concepts and application software in their own research. Digital Signal Processing with Kernel Methods provides a comprehensive overview of kernel methods in signal processing, without restriction to any application field. It also offers example applications and detailed benchmarking experiments with real and synthetic datasets throughout. Readers can find further worked examples with Matlab source code on a website developed by the authors: http://github.com/DSPKM • Presents the necessary basic ideas from both digital signal processing and machine learning concepts • Reviews the state-of-the-art in SVM algorithms for classification and detection problems in the context of signal processing • Surveys advances in kernel signal processing beyond SVM algorithms to present other highly relevant kernel methods for digital signal processing An excellent book for signal*

processing researchers and practitioners, Digital Signal Processing with Kernel Methods will also appeal to those involved in machine learning and pattern recognition.

Analysis for Applied Mathematics

Springer Science & Business Media *This well-written book contains the analytical tools, concepts, and viewpoints needed for modern applied mathematics. It treats various practical methods for solving problems such as differential equations, boundary value problems, and integral equations. Pragmatic approaches to difficult equations are presented, including the Galerkin method, the method of iteration, Newton's method, projection techniques, and homotopy methods.*

Applied Structural and Mechanical Vibrations

Theory, Methods and Measuring Instrumentation

CRC Press *The fundamental concepts, ideas and methods underlying all vibration phenomena are explained and illustrated in this book. The principles of classical linear vibration theory are brought together with vibration measurement, signal processing and random vibration for application to vibration problems in all areas of engineering. The book pays partic*

Foundations of Signal Processing

Cambridge University Press *This comprehensive and engaging textbook introduces the basic principles and techniques of signal processing, from the fundamental ideas of signals and systems theory to real-world applications. Students are introduced to the powerful foundations of modern signal processing, including the basic geometry of Hilbert space, the mathematics of Fourier transforms, and essentials of sampling, interpolation, approximation and compression The authors discuss real-world issues and hurdles to using these tools, and ways of adapting them to overcome problems of finiteness and localization, the limitations of uncertainty, and computational costs. It includes over 160 homework problems and over 220 worked examples, specifically designed to test and expand students' understanding of the fundamentals of signal processing, and is accompanied by extensive online materials designed to aid learning, including Mathematica® resources and interactive demonstrations.*

Space-Time Algebra

Birkhäuser *This small book started a profound revolution in the development of mathematical physics, one which has reached many working physicists already, and which stands poised to bring about far-reaching change in the future. At its heart is the use of Clifford algebra to unify otherwise disparate mathematical languages, particularly those of spinors, quaternions, tensors and differential forms. It provides a unified approach covering all these areas and thus leads to a very efficient 'toolkit' for use in physical problems including quantum mechanics, classical mechanics, electromagnetism and relativity (both special and general) – only one mathematical system needs to be learned and understood, and one can use it at levels which extend right through to current research topics in each of these areas. These same techniques, in the form of the 'Geometric Algebra', can be applied in many areas of engineering, robotics and computer science, with no changes necessary – it is the same underlying mathematics, and enables physicists to understand topics in engineering, and engineers to understand topics in physics (including aspects in frontier areas), in a way which no other single mathematical system could hope to make possible. There is another aspect to Geometric Algebra, which is less tangible, and goes beyond questions of mathematical power and range. This is the remarkable insight it gives to physical problems, and the way it constantly suggests new features of the physics itself, not just the mathematics. Examples of this are peppered throughout 'Space-Time Algebra', despite its short length, and some of them are effectively still research topics for the future. From the Foreward by Anthony Lasenby*

Exercises in Functional Analysis

Springer Science & Business Media *This book contains almost 450 exercises, all with complete solutions; it provides supplementary examples, counter-examples, and applications for the basic notions usually presented in an introductory course in Functional Analysis. Three comprehensive sections cover the broad topic of functional analysis. A large number of exercises on the weak topologies is included.*

Advances of Computational Intelligence in Industrial

Systems

Springer Science & Business Media *Computational Intelligence (CI) has emerged as a rapidly growing field over the past decade. This volume reports the exploration of CI frontiers with an emphasis on a broad spectrum of real-world applications. Such a collection of chapters has presented the state-of-the-art of CI applications in industry and will be an essential resource for professionals and researchers who wish to learn and spot the opportunities in applying CI techniques to their particular problems.*

Tamkang Journal of Mathematics

Information Processing and Management of Uncertainty in Knowledge-Based Systems. Theory and Foundations

17th International Conference, IPMU 2018, Cádiz, Spain, June 11-15, 2018, Proceedings, Part I

Springer *This three volume set (CCIS 853-855) constitutes the proceedings of the 17th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, IPMU 2017, held in Cádiz, Spain, in June 2018. The 193 revised full papers were carefully reviewed and selected from 383 submissions. The papers are organized in topical sections on advances on explainable artificial intelligence; aggregation operators, fuzzy metrics and applications; belief function theory and its applications; current techniques to model, process and describe time series; discrete models and computational intelligence; formal concept analysis and uncertainty; fuzzy implication functions; fuzzy logic and artificial intelligence problems; fuzzy mathematical analysis and applications; fuzzy methods in data mining and knowledge discovery; fuzzy transforms: theory and applications to data analysis and image processing; imprecise probabilities: foundations and applications; mathematical fuzzy logic, mathematical morphology; measures of comparison and entropies for fuzzy sets and their extensions; new trends in data aggregation; pre-*

aggregation functions and generalized forms of monotonicity; rough and fuzzy similarity modelling tools; soft computing for decision making in uncertainty; soft computing in information retrieval and sentiment analysis; tri-partitions and uncertainty; decision making modeling and applications; logical methods in mining knowledge from big data; metaheuristics and machine learning; optimization models for modern analytics; uncertainty in medicine; uncertainty in Video/Image Processing (UVIP).

Modern Real Analysis

Springer *This first year graduate text is a comprehensive resource in real analysis based on a modern treatment of measure and integration. Presented in a definitive and self-contained manner, it features a natural progression of concepts from simple to difficult. Several innovative topics are featured, including differentiation of measures, elements of Functional Analysis, the Riesz Representation Theorem, Schwartz distributions, the area formula, Sobolev functions and applications to harmonic functions. Together, the selection of topics forms a sound foundation in real analysis that is particularly suited to students going on to further study in partial differential equations. This second edition of Modern Real Analysis contains many substantial improvements, including the addition of problems for practicing techniques, and an entirely new section devoted to the relationship between Lebesgue and improper integrals. Aimed at graduate students with an understanding of advanced calculus, the text will also appeal to more experienced mathematicians as a useful reference.*

The Elements of Continuum Biomechanics

John Wiley & Sons *An appealing and engaging introduction to Continuum Mechanics in Biosciences This book presents the elements of Continuum Mechanics to people interested in applications to biological systems. It is divided into two parts, the first of which introduces the basic concepts within a strictly one-dimensional spatial context. This policy has been adopted so as to allow the newcomer to Continuum Mechanics to appreciate how the theory can be applied to important issues in Biomechanics from the very beginning. These include mechanical and thermodynamical balance, materials with fading memory and chemically reacting mixtures. In the second part of the book, the fully fledged three-dimensional theory is presented and applied to hyperelasticity of soft tissue, and to theories of remodeling, aging and growth. The book closes with a chapter devoted to Finite Element analysis. These and other topics are illustrated with case studies motivated by biomedical applications, such as vibration of air in the air canal, hyperthermia treatment of tumours, striated muscle memory, biphasic model of cartilage and adaptive elasticity of bone. The book offers a challenging and appealing introduction to Continuum Mechanics for students and researchers of biomechanics, and other engineering*

and scientific disciplines. Key features: Explains continuum mechanics using examples from biomechanics for a uniquely accessible introduction to the topic Moves from foundation topics, such as kinematics and balance laws, to more advanced areas such as theories of growth and the finite element method.. Transition from a one-dimensional approach to the general theory gives the book broad coverage, providing a clear introduction for beginners new to the topic, as well as an excellent foundation for those considering moving to more advanced application