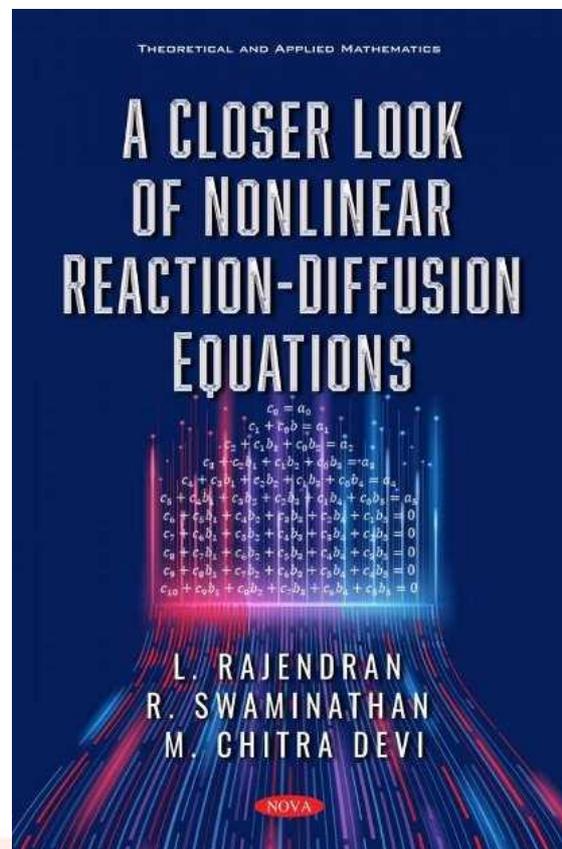


MATHEMATICS

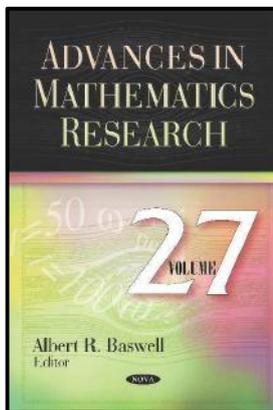


TITLES PUBLISHED BY NOVA SCIENCE

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Advances in Mathematics Research



Advances in Mathematics Research

Edited by Albert R. Baswell

Advances in Mathematics Research. Volume 27 first aims to approach the dynamical systems analysis from a new standpoint; feedback linearization, a method with a lot of applications. For both linear and non-linear dynamic systems, this method offers an interesting perspective from the qualitative approach stance.

The authors examine the implementation of gas-assisted electrical discharge machining of D3 die steel. One of the fundamental disadvantages of the traditional EDM machining process is poor material removal rate.

Numerical results for a wide range of Reynolds numbers are presented, including moderate and high Reynolds numbers, and two different numerical schemes to solve this kind of problem are described.

For the analysis and interpretation of probabilistic engineering calculations, including those concerning the estimation of the safety of structures, symmetrical normal distribution is often used. In one study, the authors propose that such a distribution may be a linear combination of normal distribution and Gumbel distribution.

This compilation goes on to present the problems that arise from the $M|G|^\infty$ queue system busy period and busy cycle, an idle period followed by a busy period. The renewal function is calculated, as well as the “peakedness” and the “modified peakedness” for the $M|G|^\infty$ busy period and busy cycle time length.

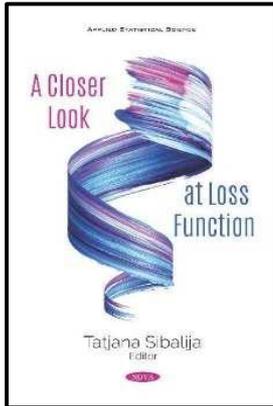
Based on earlier research and using new mathematical methods, the authors present a theory using functional integrals for obtaining probability distributions of phase invariants in which N (the number of atoms in the asymmetric unit) doesn't appear anymore.

Also proposed is a numerically realizable explicit formula for the solution to the Cauchy problem for a linear elliptic equation.

In closing, a mathematical model assessing the effect of tobacco smoking on the dynamics of tuberculosis transmission is formulated and analyzed. In the absence and presence of smokers, theoretical results indicate the possibility of the phenomenon of backward bifurcation where a stable disease-free equilibrium co-exists with a stable endemic equilibrium when the associated reproduction threshold is less than unity.

Volume 27 - HB 9781536172461 £229.99 March 2020 Nova Science Publishers 221 pages

Volume 28 - HB 9781536182514 £229.99 September 2020 Nova Science Publishers 216 pages



A Closer Look at Loss Function

Tatjana V. Sibalija

The quality loss function, introduced by Japanese engineer, statistician and scientist Dr. Genichi Taguchi in the 1980s, is still one of the most interesting topics in applied industrial statistics and quality engineering and management, which presented a paradigm shift in quality loss and product, process and/or system quality conception. Taguchi emphasized a proactive approach toward quality in terms of embedding quality requirements into the design of product, process and/or system, which highly influenced today's quality approaches such as the 'quality-by-design' concept strongly demanded in the era of the fourth industrial revolution that we are currently facing.

This book contributes to a further development, extension and application of the Taguchi's quality loss concept, aiming to overcome limitations of the traditional quadratic quality loss function and to address complex demands and circumstances in a dynamic and globalized contemporary industrial sector. It presents essential issues and heterogeneous complementary aspects of the quality loss function, including the theoretical background and advances as well as different application studies.

The opening chapter is dedicated to the quality loss functions used in quality engineering, presenting an in-depth theoretical background of the traditional loss function, the bounded loss function concept, i.e. the reflected normal loss function, and the family of inverted loss functions, and proposing the recently developed loss function types.

The second chapter is focused on the Taguchi's and inverted quality loss functions, univariate and multivariate types, and their advances and implications in tackling real, heterogeneous industrial problems in statistical quality and process control.

The third chapter considers an application of the quality loss and quality cost concepts at a system level, by introducing the quality policy model of an organization, developed and implemented in a middle-sized manufacturing company in the automotive industry.

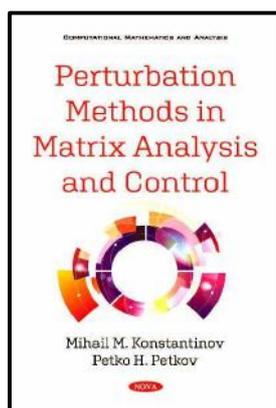
The fourth chapter deals with the comparison and alignment of the Taguchi's orthogonal arrays and the traditional full factorial approach for experimental design, including also the method for analysis of experimental results, depicted by two use cases from different industrial sectors.

The last chapter proposes an advanced quality loss-based method for discrete process parameter optimization that tackles processes characterized by multiple correlated responses. The benefits of its implementation are illustrated on heterogeneous process optimization problems, and comparison with several frequently used optimization methods clearly demonstrates its superiority, effectiveness and applicability in real industrial conditions.

Therefore, this book offers a unique combination of two aspects relevant for scientists and statisticians, and engineers and managers, respectively: (i) strong scientific background on the quality loss function, its modifications and extensions, and novel, advanced developments; (ii) hands on approach for application of the quality loss function-based methods designed for product, process and/or system quality improvement in different stages, from the experimental design, via analysis of experimental results and process parameter optimization, toward an organizational quality policy implementation.

HB 9781536165401 £146.99 February 2020 Nova Science Publishers 248 pages

Computational Mathematics & Analysis



Perturbation Methods in Matrix Analysis and Control

Mihail M. Konstantinov

The book presents a unified approach to the perturbation analysis in Matrix Analysis and Control, based on the method of splitting operators and Lyapunov majorant functions. Combined with the Schauder or Banach fixed point principles, this approach allows to obtain rigorous non-local perturbation bounds for a set of important objects in Linear Algebra and Control Theory. Among them are the Schur system of a matrix, the QR decomposition of a matrix, the orthogonal canonical forms of time-invariant linear systems, the state and output feedback gains in pole assignment design, the generalized Schur system of a pair of matrices, the Hamiltonian-Schur and block Hamiltonian-Schur forms of Hamiltonian matrices, and others. In this way, the approach proposed can be used as a unified tool in deriving asymptotic and nonlocal perturbation bounds in matrix analysis and control theory.

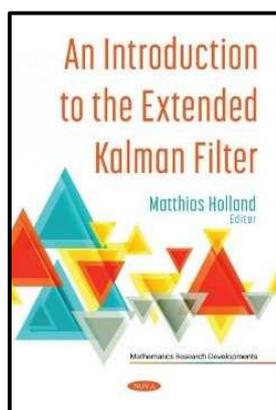
An important technique of the method considered is the construction of an operator equation, which is equivalent to the perturbed problem. It is based on the splitting of a certain linear matrix operator and its argument into strictly lower, diagonal and strictly upper parts, respectively. This allows to unify the perturbation analysis of matrix problems, involving unitary matrices, in which the resulting matrix is upper triangular.

Some other issues such as perturbation analysis of problems with non-unique solution and construction of improved asymptotic perturbation bounds are also considered.

The book is intended as a reference in the area of matrix computations and control theory. It will be of interest to researchers in the area of matrix analysis, linear control theory and applied mathematics. The book may also be useful for graduate students in the area of applied mathematics.

HB 9781536174700 £178.99 April 2020 Nova Science Publishers 281 pages

Mathematics Research Developments



An Introduction to the Extended Kalman Filter

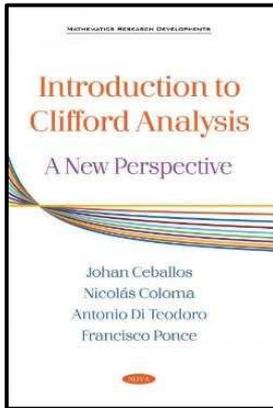
Edited by Matthias Holland

An Introduction to the Extended Kalman Filter first presents a study wherein a two-stage approach for the estimation of a spacecraft's position and velocity using single station antenna tracking data is proposed.

Since the Kalman filter and its variants are widely used for estimation in diverse domains, the authors also present a review of fault detection, diagnosis and fault tolerant control of descriptor/differential algebraic equation systems specifically focused on the Kalman filter and its variants.

The closing contribution provides insight into the intrinsic convergence of the extended Kalman filter when operated in the stochastic frame for the class of systems and outputs considered.

PB 9781536188752 £75.99 November 2020 Nova Science Publishers 102 pages



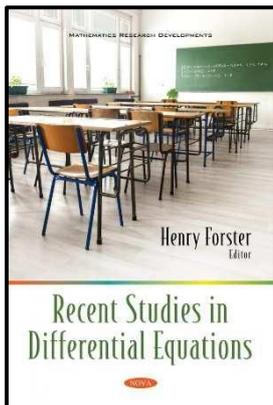
Introduction to Clifford Analysis A New Perspective

Johan Ceballos

This book pursues to exhibit how we can construct a Clifford type algebra from the classical one. The basic idea of these lecture notes is to show how to calculate fundamental solutions to either first-order differential operators of the form $D = \sum_{i=0}^n [e_i \delta_i]$ or second-order elliptic differential operators $\bar{D} D$, both with constant coefficients or combinations of this kind of operators. After considering in detail how to find the fundamental solution we study the problem of integral representations in a classical Clifford algebra and in a dependent-parameter Clifford algebra which generalizes the classical one. We also propose a basic method to extend the order of the operator, for instance $D^n, n \in \mathbb{N}$ and how to produce integral representations for higher order operators and mixtures of them. Although the Clifford algebras have produced many applications concerning boundary value problems, initial value problems, mathematical physics, quantum chemistry, among others; in this book we do not discuss these topics as they are better discussed in other courses. Researchers and practitioners will find this book very useful as a source book.

The reader is expected to have basic knowledge of partial differential equations and complex analysis. When planning and writing these lecture notes, we had in mind that they would be used as a resource by mathematics students interested in understanding how we can combine partial differential equations and Clifford analysis to find integral representations. This in turn would allow them to solve boundary value problems and initial value problems. To this end, proofs have been described in rigorous detail and we have included numerous worked examples. On the other hand, exercises have not been included.

PB 9781536185331 £87.99 October 2020 Nova Science Publishers 182 pages



Recent Studies in Differential Equations

Edited by Henry Forster

This compilation introduces and studies the class of (asymptotically) Stepanov almost automorphic functions with variable exponents, presenting a few relevant applications of abstract Volterra integro-differential inclusions in Banach spaces.

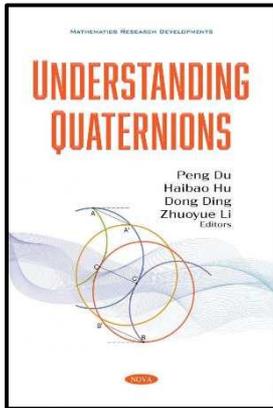
The authors study the existence and regularity of solutions for some nonlinear second order differential equations, showing the existence of mild solutions and giving sufficient conditions ensuring the existence of strict solutions.

Sufficient conditions for the oscillation of solutions of neutral impulsive differential equations are also presented.

In the penultimate study, the oscillatory behaviour of the solutions of a class of nonlinear first-order neutral differential equations with several delays of one form are studied.

In addition, some sufficient conditions for the oscillation of solutions to the first and second-order neutral delay difference equation are presented.

PB 9781536183894 £75.99 October 2020 Nova Science Publishers 130 pages



Understanding Quaternions

Edited by Peng Du

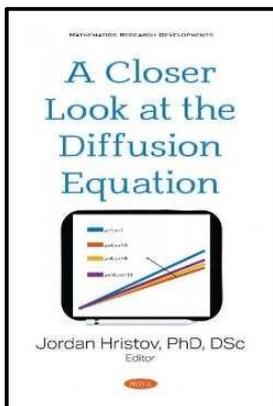
Quaternions are members of a noncommutative division algebra first invented by William Rowan Hamilton. They form an interesting algebra where each object contains 4 scalar variables, instead of Euler angles, which is useful to overcome the gimbal lock phenomenon when treating the rotation of objects.

This book is about the mathematical basics and applications of quaternions. The first four chapters mainly concerns the mathematical theories, while the latter three chapters are related with three application aspects. It is expected to provide useful clues for researchers and engineers in the related area. In detail, this book is organized as follows:

In Chapter 1, mathematical basics including the quaternion algebra and operations with quaternions, as well as the relationships of quaternions with other mathematical parameters and representations are demonstrated. In Chapter 2, how quaternions are formulated in Clifford Algebra, how it is used in explaining rotation group in symplectic vector space and parallel transformation in holonomic dynamics are presented. In Chapter 3, the wave equation for a spin 3/2 particle, described by 16-component vector-bispinor, is investigated in spherical coordinates.

In Chapter 4, hyperbolic Lobachevsky and spherical Riemann models, parameterized coordinates with spherical and cylindric symmetry are studied. In Chapter 5, ship hydrodynamics with allowance of trim and sinkage is investigated and validated with experiments. In Chapter 6, the ballast flying phenomenon based on Discrete Discontinuous Analysis is presented. In Chapter 7, a numerical study is proposed to analyze the effect of the caisson sliding subjected to a hydrodynamic loading in the stability of the rear side of the rubble mound breakwater.

PB 9781536183436 £87.99 October 2020 Nova Science Publishers 197 pages



A Closer Look at the Diffusion Equation

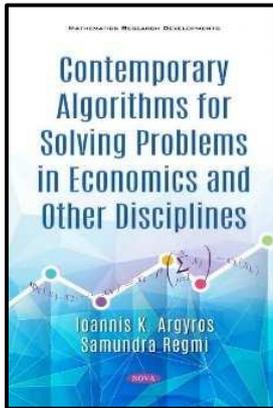
Edited by Jordan Hristov

Diffusion is a principle transport mechanism emerging widely at different scale, from nano to micro and macro levels. This is a contributed book of seventh chapters encompassing local and no-local diffusion phenomena modelled with integer-order (local) and non-local operators. This book collates research results developed by scientists from different countries but with common research interest in modelling of diffusion problems. The results reported encompass diffusion problems related to efficient numerical modelling, hypersonic flows, approximate analytical solutions of solvent diffusion in polymers and wetting of soils. Some chapters are devoted to fractional diffusion problem with operators with singular and non-singular memory kernels.

The book content cannot present the entire rich area of problems related to modelling of diffusion phenomena but allow seeing some new trends and approaches in the modelling technologies. In this context, the fractional models with singular and non-singular kernels the numerical methods and the development of the integration techniques related to the integral-balance approach form fresh fluxes of ideas to this classical engineering area of research.

The book is oriented to researchers; master and PhD students involved in diffusion problems with a variety of application and could serves as a rich reference source and a collection of texts provoking new ideas.

PB 9781536183306 £87.99 October 2020 Nova Science Publishers 189 pages



Contemporary Algorithms for Solving Problems in Economics and Other Disciplines

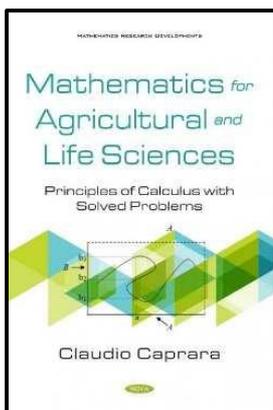
Edited by Ioannis K. Argyros

Numerous problems from diverse disciplines can be converted using mathematical modeling to an equation defined on suitable abstract spaces usually involving the n -dimensional Euclidean space or Hilbert space or Banach Space or even more general spaces. The solution of these equations is sought in closed form. But this is possible only in special cases. That is why researchers and practitioners use algorithms which seems to be the only alternative.

Due to the explosion of technology, scientific and parallel computing, faster and faster computers become available. This development simply means that new optimized algorithms should be developed to take advantage of these improvements. There is exactly where we come in with our book containing such algorithms with application especially in problems from Economics but also from other areas such as Mathematical: Biology, Chemistry, Physics, Scientific, Parallel Computing, and also Engineering.

The book can be used by senior undergraduate students, graduate students, researchers and practitioners in the aforementioned area in the class room or as a reference material. Readers should know the fundamentals of numerical functional analysis, economic theory, and Newtonian physics. Some knowledge of computers and contemporary programming shall be very helpful to the readers.

HB 9781536181289 £178.99 July 2020 Nova Science Publishers 325 pages



Mathematics for Agricultural and Life Sciences Principles of Calculus with Solved Problems

Edited by Claudio Caprara

One of the difficulties that arise in teaching mathematics is related to the identification of the target and the most appropriate teaching methods for the people who are part of it.

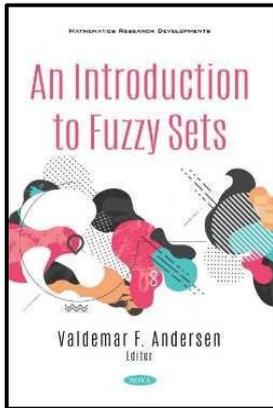
This aspect, true for all disciplines, applies to mathematics in particular. In fact, for example, an axiomatic approach is certainly suitable for Mathematical, Physical and Engineering Sciences, while students of many applied sciences, such as Agricultural and Life Sciences, need to focus on calculation tools and methodologies useful for their professional development rather than in dealing with the theoretical foundations of mathematics.

The peculiarity of this book is not so much in setting classical approach “Theorem: Hypothesis, Thesis” with relative proofs, but in adopting a more pragmatic approach that renounce classical demonstrations, while maintaining a formal coherence in the topics dealt with.

In this perspective, considering the approach required by the target to which it is addressed, the objective of this book is to provide methods to studying the variation of a phenomenon and its cumulative effects and consequently the study of the functions and the calculation of integrals respectively.

One of the qualifying features is given by a series of completely resolved problems, occupying two-thirds of the volume, in which each mathematical step is detailed to understand “step by step” how to obtain the solution.

HB 9781536180275 £211.99 July 2020 Nova Science Publishers 402 pages

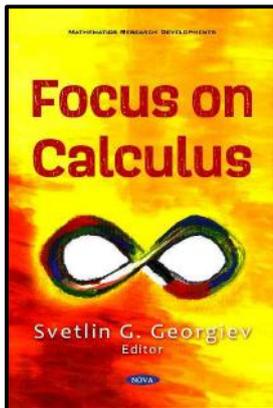


An Introduction to Fuzzy Sets

Valdemar F. Andersen

An Introduction to Fuzzy Sets provides a comparison of the quality of life in urban, intermediate and rural NUTS III regions in Portugal, with the main goal of identifying and analysing the necessary and conditions for a high quality of life in those different regions. The authors assess the necessary and sufficient conditions for higher Human Development Index levels, aiming to determine whether the same pattern could be used to explain the happiness index. In order to represent the applications of fuzzy set theory as well as neuro-fuzzy in industry, a literature review of these topics is carried out. As some researchers have eï

PB 9781536180121 £75.99 July 2020 Nova Science Publishers 140 pages



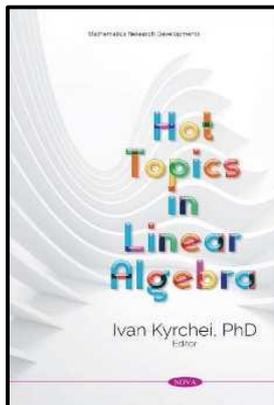
Focus on Calculus

Svetlin G. Georgiev

This book is devoted to some recent aspects of calculus. The book contains seven chapters. Chapter 1 introduces the conception for conformable delta (Hilger) derivative and some of its properties. Results in this chapter include basic conformable delta derivative, the conformable exponential function, conformable trigonometric and hyperbolic functions, conformable delta integral and integral rules and Taylor's formula. They are considered first order conformable dynamic equations on time scales. Chapter 2 is devoted to some classes second order quadratic difference equations. They are given criteria for existence of a unique equilibrium point that is stable and unstable, existence of prime period-two solutions. Chapter 3 is aimed to develop two calculi over the specific algebraic operations, preserving the preceding relativistic addition formula and having all ordinary properties. Chapter 4 is devoted to principles of hypercomplex random function calculus.

Generalized Gaussian-type hypercomplex valued measures are studied. Random functions controlled by these measures are investigated. Solutions of hyperbolic PDEs over hypercomplex numbers such as the octonion algebra and Cayley-Dickson algebras are scrutinized. Chapter 5 covers the interesting historical aspects of the spreadsheets and their distinct advantages. It is described how the ubiquitous Microsoft Excel spreadsheets can be used to implement well-known numerical methods such as Simpson's Rule and Trapezoidal Rules. Appropriate examples are presented in substantial detail. The aim of Chapter 6 is to show some didactic tools that can be suggested by professors so that students can recall those issues saved in the deepest part of their minds. In Chapter 7, based on fractional differences, a fractional calculus is developed which complies with most of the properties that is to say non-differentiability, non-commutativity of derivative and long-range memory. The book is addressed to a wide audience of specialists such as mathematicians, physicists, engineers and biologists.

HB 9781536173376 £178.99 May 2020 Nova Science Publishers 221 pages



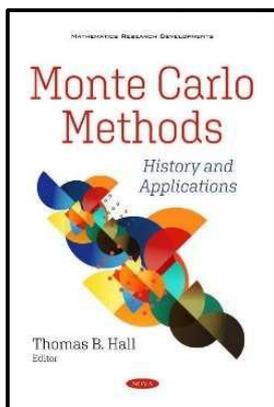
Hot Topics in Linear Algebra

Edited by Ivan Kyrchei

Linear algebra is the branch of mathematics concerning vector spaces and linear mappings between such spaces. Systems of linear equations with several unknowns are naturally represented using the formalism of matrices and vectors. So we arrive at the matrix algebra, etc. Linear algebra is central to almost all areas of mathematics. Many ideas and methods of linear algebra were generalized to abstract algebra. Functional analysis studies the infinite-dimensional version of the theory of vector spaces. Combined with calculus, linear algebra facilitates the solution of linear systems of differential equations. Linear algebra is also used in most sciences and engineering areas because it allows for the modeling of many natural phenomena, and efficiently computes with such models.

"*Hot Topics in Linear Algebra*" presents original studies in some areas of the leading edge of linear algebra. Each article has been carefully selected in an attempt to present substantial research results across a broad spectrum. Topics discussed herein include recent advances in analysis of various dynamical systems based on the Gradient Neural Network; Cramer's rules for quaternion generalized Sylvester-type matrix equations by using noncommutative row-column determinants; matrix algorithms for finding the generalized bisymmetric solution pair of general coupled Sylvester-type matrix equations; explicit solution formulas of some systems of mixed generalized Sylvester-type quaternion matrix equations; new approaches to studying the properties of Hessenberg matrices by using triangular tables and their functions; researching of polynomial matrices over a field with respect to semi-scalar equivalence; mathematical modeling problems in chemistry with applying mixing problems, which the associated MP-matrices; and some visual apps, designed in Scilab, for the learning of different topics of linear algebra.

HB 9781536177701 £178.99 June 2020 Nova Science Publishers 307 pages



Monte Carlo Methods History and Applications

Edited by Thomas B. Hall

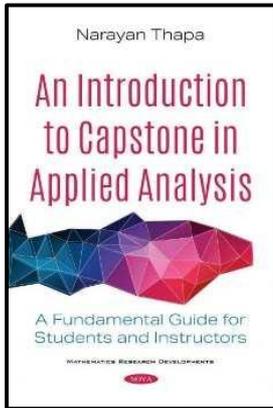
In this compilation, the authors first consider applying the Monte Carlo method to the general form of the heat equation that is used for analyzing conduction heat transfer. The Monte Carlo method is then extended to some convection heat transfer applications by representing the probabilistic interpretation of the energy equation to obtain the temperature profile.

Following this, *Monte Carlo Methods: History and Applications* discusses the Monte Carlo methods needed for the estimation of the mean glandular dose in both digital mammography and digital breast tomosynthesis. Various breast anatomies are considered.

The gradual development of the Monte Carlo method for solving problems of mathematical chemistry is considered. A comparison of various quantitative structure-property/activity relationships based on the Monte Carlo method is also presented.

Lastly, the Monte Carlo technique is used to characterize the statistical distributions of received measurements in an electric energy power system, as well as to quantify the correlations among these variables. To check the numerical accuracy of the results, the point estimate algorithm is employed.

PB 9781536177237 £87.99 May 2020 Nova Science Publishers 207 pages



An Introduction to Capstone in Applied Analysis A Fundamental Guide for Students and Instructors

Narayan Thapa

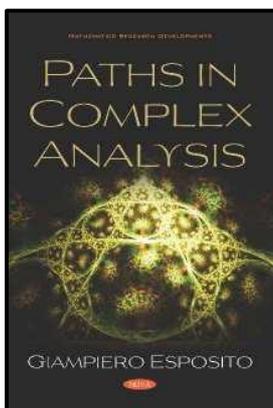
Inverse problems are one of the oldest, most important mathematical problems in science and engineering. However, the field of inverse problems has undergone rapid development in the last two decades due to the massive increase in computing power and the development of powerful numerical techniques such as finite difference method, finite element method, finite volume method and spectral method.

Because of their applications in medical imaging, underground prospecting, nondestructive testing, astronomical imaging, image processing, remote sensing, and data mining, the Business, Industry and Government (BIG) sectors are very interested in applied inverse problems.

Despite its great importance and demand, there is no project oriented applied and computational inverse problem book that can be adapted as a text for senior undergraduates as their capstone experience and pathway to research in applied analysis. The goal of this book is to fill this gap and provide opportunity to students, professors and researchers in biosciences, applied sciences, applied-computational mathematics, engineering, mathematical programming, mathematical economics, mathematical biology and optimization via applied and computational inverse problem projects.

This book is sequenced as three major parts. The part of the book that includes chapters 1, 2 and 3 highlights major concepts including results in applied analysis. The second part of the book that includes chapters 4 and 5 displays the key numerical methods and programming in MATLAB. The final part of the book that includes chapters 6, 7, 8, 9, 10, 11 and 12 showcases several inverse-problem-related projects done with students.

HB 9781536174588 £146.99 April 2020 Nova Science Publishers 191 pages

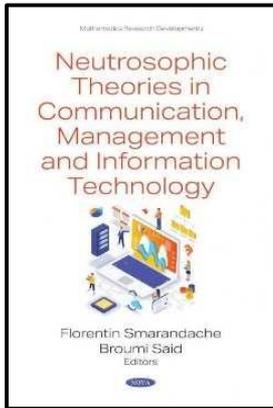


Paths in Complex Analysis

Giampiero Esposito

Several scientists learn only a first course in complex analysis, and hence they are not familiar with several important properties: every polygenic function defines a congruence of clocks; the basic properties of algebraic functions and abelian integrals; how mankind arrived at a rigorous definition of Riemann surfaces; the concepts of dianalytic structures and Klein surfaces; the Weierstrass elliptic functions; the automorphic functions discovered by Poincare' and their links with the theory of Fuchsian groups; the geometric structure of fractional linear transformations; Kleinian groups; the Heisenberg group and geometry of the complex ball; complex powers of elliptic operators and the theory of spectral zeta-functions; an assessment of the Poincare' and Dieudonne' definitions of the concept of asymptotic expansion. The book is unique both for the selection of topics and for the readable access that it offers to the otherwise too large landscape of modern complex analysis.

PB 9781536170573 £75.99 January 2020 Nova Science Publishers 140 pages



Neutrosophic Theories in Communication, Management and Information Technology

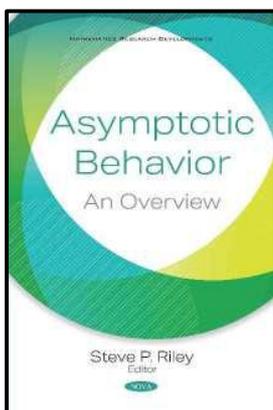
Edited by Florentin Smarandache

Contributing to the fast growing new field of neutrosophy, this book provides a significant collection of unedited articles covering the latest ongoing research area. Neutrosophy is above all a new view on modelling, tailored to effectively address the uncertainties inherent of the real world. In short, Neutrosophy supersedes in logics the binary approach of true or false by introducing a third state: neutral, which can be also interpreted as indeterminate, uncertain, inconsistent Development of neutrosophy since its conception by Smarandache in 1988 exponentially grows by conceptual extensions of logics, measure, sets, graphs, as well as practical applications in namely all fields. It can be think as generalization of fuzzy logic and its variants like intuitionistic fuzzy logic.

Registered in wide collection of books on this promising field, here we deliver to researchers, lecturers and postgraduate students pursuing research on neutrosophic a set of eighteen unreleased articles on state of the art theoretical developments, applications and understanding of neutrosophy. This volume complements the reference works of the founder and extend the already numerous books of this editor on the subject. This book starts by describing a major application of neutrosophy: product acceptance determination using a similarity measure index by applying neutrosophic statistics. In one the latest leading mathematics branch: Graph theory, we provide an article on neutrosophic extension of graphs that we can call a neutrosophic graph. A reflection is given on the true nature of neutrosophy by exploring its link with learning such as by Artificial Neural Networks, including Deep Learning. Again, in Mathematics a discussion is made on the solving of systems of linear equations in neutrosophic representation. We also go to the opposite of theory, down to the practical details of implementation for topology using the C# language. Neutrosophic probability is another big new research field. Here, we present a study on the advantages of using neutrosophic variables.

Other discipline such as algebra, topology, decision making as well as problem as in logistics and transport are concerned by the remaining articles. Last but not least, we would like to finally mention a major paper to conclude this short presentation of our book titled «When Neutrosophic Theory Meets Three-Way Decisions».

HB 9781536174854 £211.99 May 2020 Nova Science Publishers 379 pages



Asymptotic Behavior An Overview

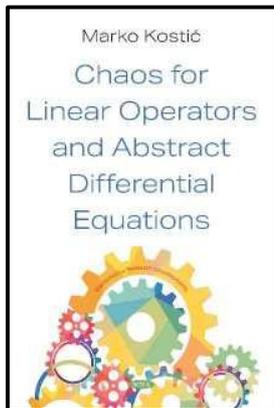
Edited by Steve P. Riley

Asymptotic Behavior: An Overview is designed to provide the reader with an exposition of some aspects of the oscillation theory of first order delay partial dynamic equations on time scales. Oscillation theory of differential equations, originated from the monumental paper of C. Sturm published in 1836, has now been recognized as an important branch of mathematical analysis from both theoretical and practical viewpoints.

Asymptotic behavior in the deep Euclidean region of momenta for four-dimensional models of quantum field theory is studied through the system of Schwinger-Dyson equations. This system is truncated by a sequence of n-particle approximations in which $n \rightarrow \infty$ goes into the complete system of Schwinger-Dyson equations.

Lastly, the authors discuss the exact analytical solution of the Schrödinger equation corresponding to the hydrogen atom confined by four spherical potentials: infinite potential, parabolic potential, constant potential, and dielectric continuum.

PB 9781536172225 £75.99 January 2020 Nova Science Publishers 148 pages



Chaos for Linear Operators and Abstract Differential Equations

Marko Kostić

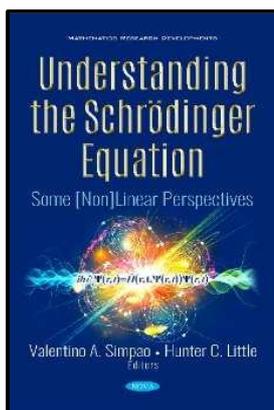
The theory of linear topological dynamics is a rapidly growing field of research over the last three decades or so. This book presents a survey of recent results of the author obtained in this field during the period 2016-2019.

Without any doubt, this is the first research monograph concerning the topological dynamics of multivalued operators and binary relations, especially, multivalued linear woperators, simple graphs, digraphs and tournaments (we feel duty bound to say that multivalued topological dynamics is still a very undeveloped field of investigation, full of open problems and possible for further expansion). Asiede from that, the main purpose of this monograph is to consider topologically dynamical properties of linear single-valued operators in Frechet spaces and abstract fractional differential equations in Frechet spaces, which could be degenerate or non-degenerate in time variable. In this monograph, we use only two types of fractional derivatives, namely the Caputo time-fractional derivatives and Weyl time-fractional derivatives. However, most results on dynamics of differential equations are given to the abstract differential equations with integer order derivatives, especially those of first and second order in time.

The monograph is consistred of two chapters; the first chapter is further broken down into nine sections, while the second chapter is broken down into seven sections. It is not of introductory character to linear topological dynamics and it is not written in a traditional manner. As in all my previously published monographs, the numbering of definitions, theorems, propositions, remarks, lemmas, corollaries, definitions, etc., are by chapter and section; the bibliography is by author in alphabetic order.

Concerning target audience, wWe deeply believe that the book could be of invaluable help to experts in linear topological dynamics, researchers in abstract partial differential equations but and also to PhD students and advanced graduate students in mathematics as well. A potential reader should be familiar with backgrounds including elementary functional analysis, measure and integration theory as well as the basic theory of abstract (degenerate) Volterra integro-differential equations. At some places, the knowledge of graph theory is preferable but not demandedable. This monograph is not intended to be a comprehensive review of current trends; albeit includes several recent results from the field of linear topological dynamics and has more than 450 titles, our reference list is far from being exhaustively complete.

HB 9781536168952 £211.99 February 2020 Nova Science Publishers 370 pages



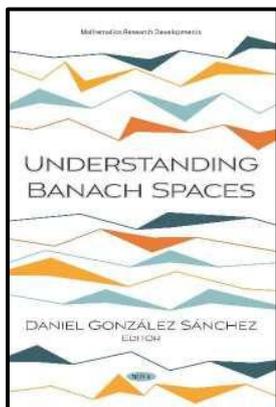
Understanding the Schrödinger Equation

Some [Non]Linear Perspectives

Edited by Valentino A. Simeao

The current offering from Nova Science Publishers titled *Understanding the Schrödinger Equation: Some [Non]Linear Perspectives* is a collection of selectively invited manuscripts from some of the world's leading workers in quantum dynamics; particularly as concerning Schrödinger's wavefunction formalism. The work is dedicated to providing an "illustrative sketch" of a few of the numerous and sundry aspects of the Schrödinger equation; ranging from a new pedagogical teaching approach, to technical applications and foundational considerations. Towards this end, the work is generally of a theoretical nature; expounding various physical aspects of both linear and nonlinear Schrödinger systems and their attendant mathematical developments.

HB 9781536176629 £211.99 June 2020 Nova Science Publishers 328 pages



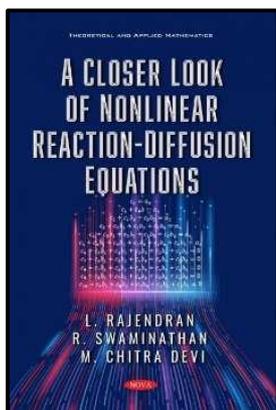
Understanding Banach Spaces

Edited by Daniel González Sánchez

This book focuses on the study of several properties of Banach spaces applied to diverse problems in functional and numerical analysis. Many problems in science, engineering and other disciplines can be expressed in the form of equations, inequalities or systems of equations using mathematical modelling. In particular, a large number of these problems can be solved using these spaces. A great multitude of examples showing the theoretical application developed appears throughout the work. Researchers and practitioners will find this book very useful as a source book, utilize its methods and also use it as a classroom text for a senior undergraduate or graduate course. It is certainly an excellent must read book.

HB 9781536167450 £247.99 February 2020 Nova Science Publishers 478 pages

Theoretical & Applied Mathematics



A Closer Look of Nonlinear Reaction-Diffusion Equations

L. Rajendran, R. Swaminathan

By using mathematical models to describe the physical, biological or chemical phenomena, one of the most common results is either a differential equation or a system of differential equations, together with the correct boundary and initial conditions. The determination and interpretation of their solution are at the base of applied mathematics. Hence the analytical and numerical study of the differential equation is very much essential for all theoretical and experimental researchers, and this book helps to develop skills in this area.

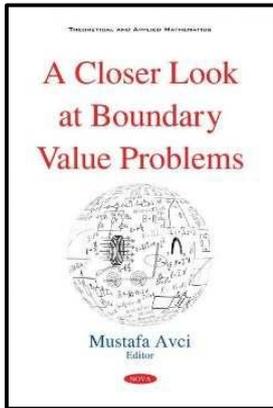
Recently non-linear differential equations were widely used to model many of the interesting and relevant phenomena found in many fields of science and technology on a mathematical basis. This problem is to inspire them in various fields such as economics, medical biology, plasma physics, particle physics, differential geometry, engineering, signal processing, electrochemistry and materials science.

This book contains seven chapters and practical applications to the problems of the real world. The first chapter is specifically for those with limited mathematical background. Chapter one presents the introduction of non-linear reaction-diffusion systems, various boundary conditions and examples. Real-life application of non-linear reaction-diffusion in different fields with some important non-linear equations is also discussed. In Chapter 2, mathematical preliminaries and various advanced methods of solving non-linear differential equations such as Homotopy perturbation method, variational iteration method, exponential function method etc. are described with examples.

Steady and non-steady state reaction-diffusion equations in the plane sheet (chapter 3), cylinder (chapter 4) and spherical (chapter 5) are analyzed. The analytical results published by various researchers in referred journals during 2007-2020 have been addressed in these chapters 4 to 6, and this leads to conclusions and recommendations on what approaches to use on non-linear reaction-diffusion equations.

Convection-diffusion problems arise very often in applied sciences and engineering. Non-linear convection-diffusion equations and corresponding analytical solutions in various fields of chemical sciences are discussed in chapter 6. Numerical methods are used to provide approximate results for the non-linear problems, and their importance is felt when it is impossible or difficult to solve a given problem analytically. Chapter 7 identifies some of the numerical methods for finding solutions to non-linear differential equations.

HB 9781536182576 £146.99 October 2020 Nova Science Publishers 207 pages



A Closer Look at Boundary Value Problems

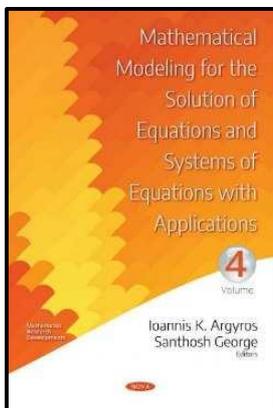
Edited by Mustafa Avci

Many problems encountered in applied mathematics or mathematical physics can be modeled by using differential equations under different boundary conditions. In this regard, linear and nonlinear partial differential equations are often used because of their strong capacity to describe and formulate many real-world problems governed by dynamical phenomena.

There are many different methods to solve linear and nonlinear problems arising from different studies in various disciplines. However, due to lack of general existence theorems for establishing solutions, scientists have to seek alternative approaches and methods. In this context, the present work demonstrates different methods and approaches to obtain solutions to some class of differential equations given under different boundary conditions.

The present book, where contemporary developments in the area of boundary value problems is shared, can be beneficial to advanced undergraduates, graduate students and researchers who are interested in the area of differential equations.

HB 9781536178579 £178.99 July 2020 Nova Science Publishers 290 pages



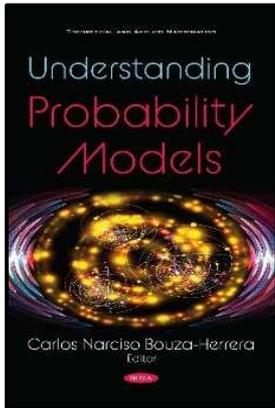
Mathematical Modeling for the Solution of Equations and Systems of Equations with Applications. Volume IV

Ioannis K. Argyros

The exponential growth of technology forces all disciplines to adjust accordingly, so they can meet the demands of a very dynamic world that heavily depends upon it. Therefore, mathematics cannot be an exception. In fact, mathematics should be the first to adjust and in fact it is. In this volume, which is a continuation of the previous three under the same title, we present state-of-the-art iterative methods for solving equations related to concrete problems from diverse areas such as applied mathematics, mathematical: biology, chemistry, economics, physics and also engineering to mention a few. Most of these methods are new and a few are old but still very popular.

One major problem with iterative methods is that the convergence domain is small in general. We have introduced a technique that finds a smaller set than before containing the iterates leading to tighter Lipschitz functions than before. This way and under the same computational effort, we derive: weaker sufficient convergence criteria (leading to a wider choice of initial points); tighter error bounds on the distances involved (i.e., fewer iterates are needed to obtain a desired predetermined accuracy), and a more precise information on the location of the solution. These advantages are considered major achievements in computational disciplines. The volume requires knowledge of linear algebra, numerical functional analysis and familiarity with contemporary computing programming. It can be used by researchers, practitioners, senior undergraduate and graduate students as a source material or as a required textbook in the classroom.

HB 9781536174748 £270.99 May 2020 Nova Science Publishers 633 pages



Understanding Probability Models

Edited by Carlos Narciso Bouza-Herrera

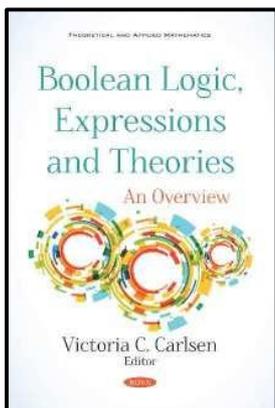
This book intends to highlight how the Theory of Probability supports, not only statistical modeling but how it allows describing different real life phenomena. It gives clues for understanding the philosophic roots of probability and how they are present in different areas of knowledge.

The readers may use the book as a source for understanding the philosophical development of probability concepts and of the intents to obtain mathematical models. The chapters deal with the understanding of how probability models are usable for determining:

- A Probabilistic model of the best flight value for the design on paper of a helicopter
- How to model the improvement of the behavior of water heating systems and of the reliability of systems
- Models for determining the probability of non responses in inquiries and to evaluate the missing data.
- The modeling of various problems related with the behavior of ordering models of use in decision rules and of general properties of Order Statistics.
- A unified study of the probabilistic aspects of two Metaheuristics: Simulated Annealing and Tabu Search.
- How to obtain the identification of econometric techniques for dealing efficiently with the study of economic growth models under endogeneity.

This book will be of interest for biometricians, statisticians, economists, engineers dealing with control and reliability, as well for informaticians.

HB 9781536169959 £146.99 April 2020 Nova Science Publishers 219 pages



Boolean Logic, Expressions and Theories An Overview

Edited by Victoria C. Carlsen

The Boolean function network is a systematical approach proposed for the inference of gene regulatory networks and related Boolean functions. This procedure utilizes two steps to integrate the hidden Markov model, likelihood ratio test and Boolean functions for discovering direct pairwise relations between genes from time-course transcriptome data. In this compilation, the authors justify the need for this novel approach and describe the inference procedure.

Next, an extended Boolean logic is introduced, denoted by LLT, called “star-finite” or “hyperfinite” logic. LLT is closely related to infinitary logics, which have been investigated extensively.

Lastly, generalized Boolean functions are introduced, and an overview with regard to constructions of Golay complementary sequences from generalized Boolean functions is given.

PB 9781536169850 £75.99 January 2020 Nova Science Publishers 131 pages



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