



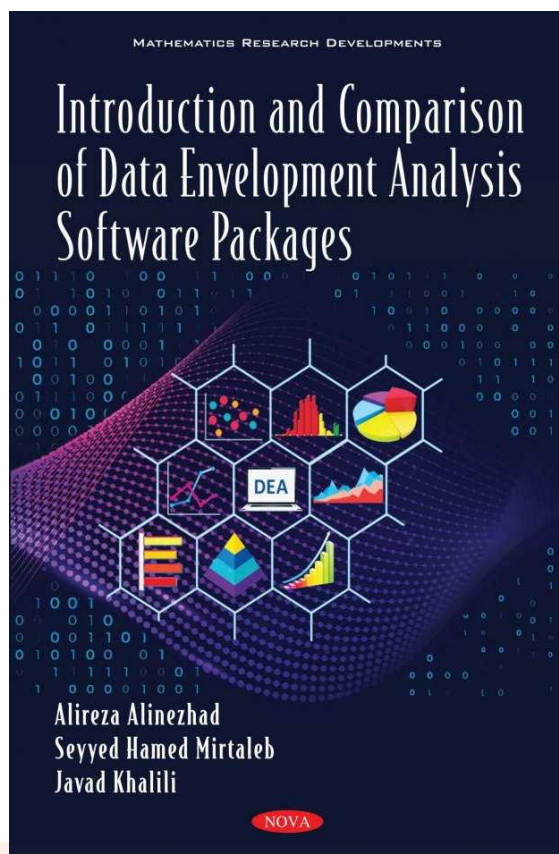
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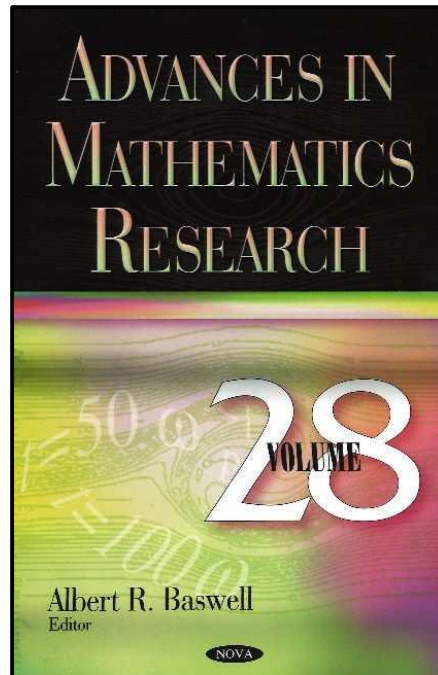
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MATHEMATICS



TITLES PUBLISHED BY NOVA SCIENCE

- A Closer Look at the Diffusion Equation
- A Closer Look of Nonlinear Reaction-Diffusion Equations
- Advances in Mathematics Research - Volume 28
- An Introduction to the Extended Kalman Filter
- Hilbert Spaces and Its Applications
- Introduction to Clifford Analysis



Advances in Mathematics Research Volume 28

Edited by Albert R. Baswell

This compilation first outlines a stochastic multicriteria modelling-to-generate-alternatives approach for waste management planning that can generate maximally different sets using a modified version of the computationally efficient Firefly Algorithm.

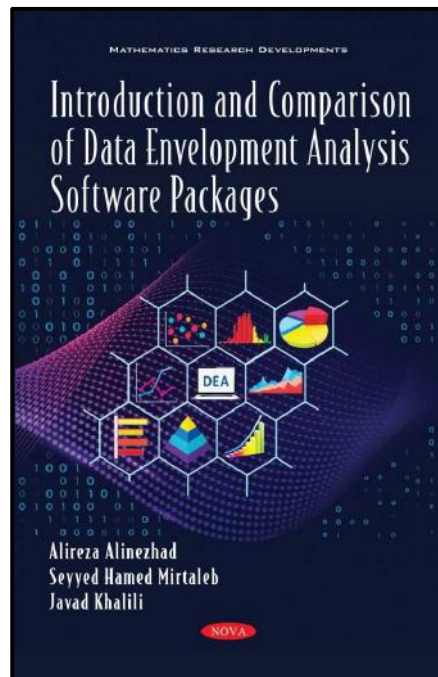
The authors present reduced-order models to pattern formations occurring in the activator-inhibitor FitzHugh-Nagumo equation, parametrized Allen-Cahn equation, non-linear Schrödinger equation, Ginzburg-Landau equation and Swift-Hohenberg equation.

The subsequent chapter deals with the singularly perturbed semilinear convection-diffusion problem, serving as an introduction to the model problems which arise frequently in counterflow flames modeling, modeling in mathematical biology, semi-conductor device simulations based on the so-called drift diffusion modeling, fluid dynamics and heat conduction.

The authors present a linear integer programming approach to construct efficient incomplete block designs for given v , b and k . The proposed approach is illustrated by constructing an A -efficient incomplete block design, and the strengths and weaknesses of this algorithm are also discussed.

One included work is devoted to the issue of the Green functions that are related to some three-point boundary and eigenvalue problems. A detailed definition is given for the Green functions provided that the considered three-point boundary value problems are governed by a class of ordinary differential equations which are associated with homogeneous boundary and continuity conditions.

HB 9781536182514 £221.99 September 2020 Nova Science Publishers 216 pages

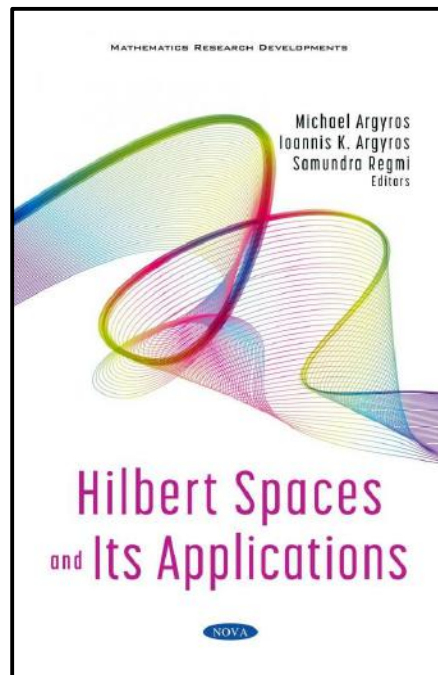


Introduction and Comparison of Data Envelopment Analysis Software Packages

Alireza Alinezhad

This book presents and compares 11 software packages of Data Envelopment Analysis (DEA). Performance measurement is done by various methods, one of which is DEA. Due to the ability of DEA models to meet practical requirements, extensive research can be conducted in the fields of mathematics, management, economics, and engineering. Therefore, during recent decades, the use of this method has been considered with significant growth among researchers. DEA evaluates the performance of Decision Making Units (DMUs) by using linear programming. Since linear programming should be solved for each DMU, performance measurement for a large number of DMUs is difficult and time-consuming. For this purpose, various software packages have been designed and developed to address these problems. Each of these software's is designed for different purposes and has different features and applications. The main objectives of this book are to introduce, express the advantages and disadvantages of each of these software packages, as well as their comparisons.

HB 9781536191196 £203.99 February 2021 Nova Science Publishers 306 pages

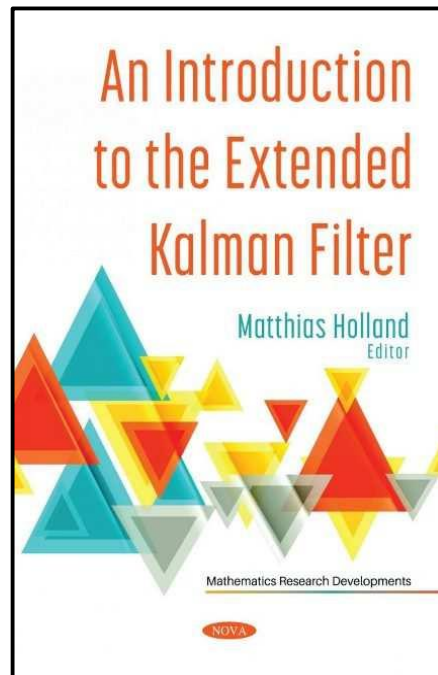


Hilbert Spaces and Its Applications

Edited by Michael Argyros

This book contains numerous selected contemporary topics, primarily in Hilbert space, although related extended material in Banach spaces and Riemannian manifolds is also included. A plethora of concrete problems from diverse disciplines are explored such as: applied mathematics; mathematical biology; chemistry; economics; physics; scientific computing, and engineering. The solutions of such equations can only be found in closed form in special cases; this forces researchers and practitioners to focus on the development of iterative methods to generate a sequence converging to the solutions, provided that some convergence criteria depending on the initial data are satisfied. Due to the exponential development of technology, new iterative methods should be found to improve existing computers and create faster and more efficient ones.

HB 9781536189834 £172.99 February 2021 Nova Science Publishers 244 pages



An Introduction to the Extended Kalman Filter

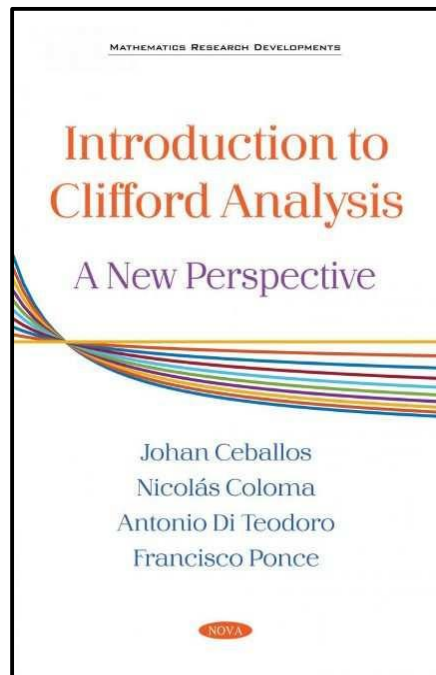
Edited by Matthias Holland

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 £72.99 November 2020 Nova Science Publishers 102 pages



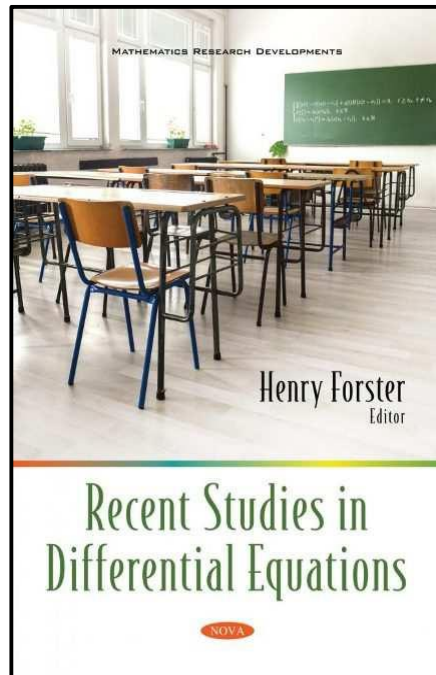
Introduction to Clifford Analysis A New Perspective

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 $D = \sum_{i=0}^n \delta_i \partial_i$ 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 £84.99 October 2020 Nova Science Publishers 151 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.

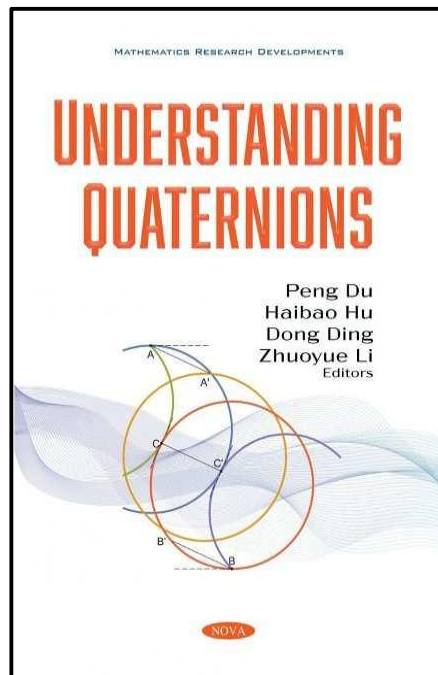
The authors study the existence and regularity of solutions for some nonlinear second order differential equations, showing the existence of mild solutions and giving sufficient conditions ensuring the existence of strict solutions.

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 £72.99 October 2020 Nova Science Publishers 130 pages



Understanding Quaternions

Edited by Peng Du

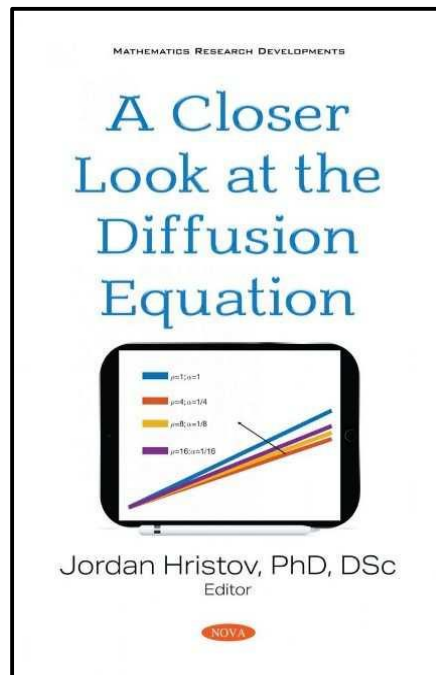
Quaternions are members of a noncommutative division algebra first invented by William Rowan Hamilton. They form an interesting algebra where each object contains 4 scalar variables, instead of Euler angles, which is useful to overcome the gimbal lock phenomenon when treating the rotation of objects.

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 £84.99 October 2020 Nova Science Publishers 184 pages



A Closer Look at the Diffusion Equation

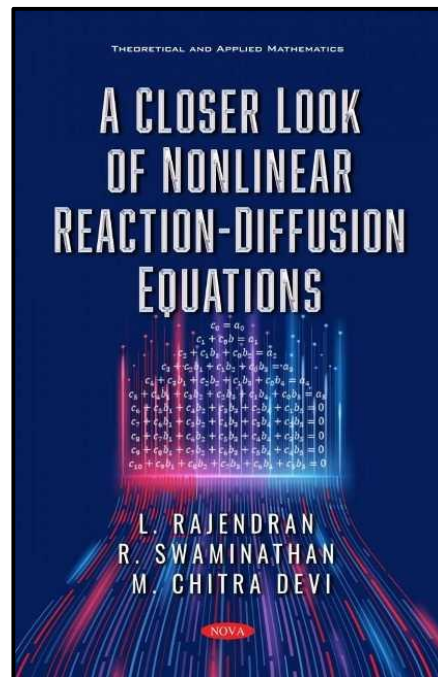
Edited by Jordan Hristov

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 non-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 £84.99 October 2020 Nova Science Publishers 189 pages



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.

HB 9781536182576 £141.99 October 2020 Nova Science Publishers 207 pages

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