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Differential Equations Terry E. Moschandreou 2018-05-23 The editor has incorporated contributions from a diverse group of leading researchers in the field of differential equations. This book aims to provide an overview of the current knowledge in the field of differential equations. The main subject areas are divided into general theory and applications. These include fixed point approach to solution existence of differential equations, existence theory of differential equations of arbitrary order, topological methods in the theory of ordinary differential equations, impulsive fractional differential equations with finite delay and integral boundary conditions, an extension of Massera's theorem for n-dimensional stochastic differential equations, phase portraits of cubic dynamic systems in a Poincare circle, differential equations arising from the three-variable Hermite polynomials and computation of their zeros and reproducing kernel method for differential equations. Applications include local discontinuous Galerkin method for nonlinear Ginzburg-Landau equation, general function method in transport boundary value problems of theory of elasticity and solution of nonlinear partial differential equations by new Laplace variational iteration method.

Existence/uniqueness theory of differential equations is presented in this book with applications that will be of benefit to mathematicians, applied mathematicians and researchers in the field. The book is written primarily for those who have some knowledge of differential equations and mathematical analysis. The authors of each section bring a strong emphasis on theoretical foundations to the book.

Wavelets and Multiscale Analysis Jonathan Cohen 2011-03-01 Since its emergence as an important research area in the early 1980s, the topic of wavelets has undergone tremendous development on both theoretical and applied fronts. Myriad research and survey papers and monographs have been published on the subject, documenting different areas of applications such as sound and image processing, denoising, data compression, tomography, and medical imaging. The study of wavelets remains a very active field of research, and many of its central techniques and ideas have evolved into new and promising research areas. This volume, a collection of invited contributions developed from talks at an international conference on wavelets, is divided into three parts: Part I is devoted to the mathematical theory of wavelets and features several papers on wavelet sets and the construction of wavelet bases in

different settings. Part II looks at the use of multiscale harmonic analysis for understanding the geometry of large data sets and extracting information from them. Part III focuses on applications of wavelet theory to the study of several real-world problems. Overall, the book is an excellent reference for graduate students, researchers, and practitioners in theoretical and applied mathematics, or in engineering.

Mathematical Models for Poroelastic Flows Anvarbek Meirmanov 2013-11-29
The book is devoted to rigorous derivation of macroscopic mathematical models as a homogenization of exact mathematical models at the microscopic level. The idea is quite natural: one first must describe the joint motion of the elastic skeleton and the fluid in pores at the microscopic level by means of classical continuum mechanics, and then use homogenization to find appropriate approximation models (homogenized equations). The Navier-Stokes equations still hold at this scale of the pore size in the order of 5 - 15 microns. Thus, as we have mentioned above, the macroscopic mathematical models obtained are still within the limits of physical applicability. These mathematical models describe different physical processes of liquid filtration and acoustics in poroelastic media, such as isothermal or non-isothermal filtration, hydraulic shock, isothermal or non-isothermal acoustics, diffusion-convection, filtration and acoustics in composite media or in porous fractured reservoirs. Our research is based upon the Nguetseng two-scale convergent method.

Asymptotic Analysis for Functional Stochastic Differential Equations Jianhai Bao 2016-11-19
This brief treats dynamical systems that involve delays and random disturbances. The study is motivated by a wide variety of systems in real life in which random noise has to be taken into consideration and the effect of delays cannot be ignored. Concentrating on such systems that are described by functional stochastic differential equations, this work focuses on the study of large time behavior,

in particular, ergodicity. This brief is written for probabilists, applied mathematicians, engineers, and scientists who need to use delay systems and functional stochastic differential equations in their work. Selected topics from the brief can also be used in a graduate level topics course in probability and stochastic processes.

Guide to Information Sources in Mathematics and Statistics Martha A. Tucker 2004-09-30
This book is a reference for librarians, mathematicians, and statisticians involved in college and research level mathematics and statistics in the 21st century. We are in a time of transition in scholarly communications in mathematics, practices which have changed little for a hundred years are giving way to new modes of accessing information. Where journals, books, indexes and catalogs were once the physical representation of a good mathematics library, shelves have given way to computers, and users are often accessing information from remote places. Part I is a historical survey of the past 15 years tracking this huge transition in scholarly communications in mathematics. Part II of the book is the bibliography of resources recommended to support the disciplines of mathematics and statistics. These are grouped by type of material. Publication dates range from the 1800's onwards. Hundreds of electronic resources—some online, both dynamic and static, some in fixed media, are listed among the paper resources. Amazingly a majority of listed electronic resources are free.

Investigations Into Living Systems, Artificial Life, and Real-world Solutions George D. Magoulas 2013-01-01
"This book provides original research on the theoretical and applied aspects of artificial life, as well as addresses scientific, psychological, and social issues of synthetic life-like behavior and abilities"--Provided by publisher.

Discovering Evolution Equations with Applications Mark McKibben 2010-07-19
Discovering Evolution Equations with Applications: Volume 1-Deterministic Equations provides an engaging, accessible

account of core theoretical results of evolution equations in a way that gradually builds intuition and culminates in exploring active research. It gives nonspecialists, even those with minimal prior exposure to analysis, the foundation to understand what evolution equations are and how to work with them in various areas of practice. After presenting the essentials of analysis, the book discusses homogenous finite-dimensional ordinary differential equations. Subsequent chapters then focus on linear homogenous abstract, nonhomogenous linear, semi-linear, functional, Sobolev-type, neutral, delay, and nonlinear evolution equations. The final two chapters explore research topics, including nonlocal evolution equations. For each class of equations, the author develops a core of theoretical results concerning the existence and uniqueness of solutions under various growth and compactness assumptions, continuous dependence upon initial data and parameters, convergence results regarding the initial data, and elementary stability results. By taking an applications-oriented approach, this self-contained, conversational-style book motivates readers to fully grasp the mathematical details of studying evolution equations. It prepares newcomers to successfully navigate further research in the field.

Handbook of Linear Algebra Leslie Hogben 2006-11-02 The Handbook of Linear Algebra provides comprehensive coverage of linear algebra concepts, applications, and computational software packages in an easy-to-use handbook format. The esteemed international contributors guide you from the very elementary aspects of the subject to the frontiers of current research. The book features an accessibl

Solvability of Nonlinear Singular Problems for Ordinary Differential Equations Irena Rachunkova 2009-04-01

Journal of Applied Mathematical Analysis and Applications

Issues in General and Specialized Mathematics Research: 2012 Edition
2013-01-10 Issues in General and Specialized Mathematics Research: 2012

Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about General Mathematics. The editors have built Issues in General and Specialized Mathematics Research: 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about General Mathematics in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in General and Specialized Mathematics Research: 2012 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at <http://www.ScholarlyEditions.com/>.

Issues in General and Specialized Mathematics Research: 2012 Edition

2013-01-10 Issues in General and Specialized Mathematics Research: 2012 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about General Mathematics. The editors have built Issues in General and Specialized Mathematics Research: 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about General Mathematics in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in General and Specialized Mathematics Research: 2012 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority,

confidence, and credibility. More information is available at <http://www.ScholarlyEditions.com/>.

Advanced Differential Equations Youssef

N. Raffoul 2022-04-25 Advanced

Differential Equations provides coverage of high-level topics in ordinary differential equations and dynamical systems. The book delivers difficult material in an accessible manner, utilizing easier, friendlier notations and multiple examples. Sections focus on standard topics such as existence and uniqueness for scalar and systems of differential equations, the dynamics of systems, including stability, with examples and an examination of the eigenvalues of an accompanying linear matrix, as well as coverage of existing literature. From the eigenvalues' approach, to coverage of the Lyapunov direct method, this book readily supports the study of stable and unstable manifolds and bifurcations. Additional sections cover the study of delay differential equations, extending from ordinary differential equations through the extension of Lyapunov functions to Lyapunov functionals. In this final section, the text explores fixed point theory, neutral differential equations, and neutral Volterra integro-differential equations. Includes content from a class-tested over multiple years with advanced undergraduate and graduate courses Presents difficult material in an accessible manner by utilizing easier, friendlier notations, multiple examples and thoughtful exercises of increasing difficulty Provides content that is appropriate for advanced classes up to, and including, a two-semester graduate course in exploring the theory and applications of ordinary differential equations Requires minimal background in real analysis and differential equations Offers a partial solutions manual for student study

Handbook of Enumerative Combinatorics

Miklos Bona 2015-03-24 Presenting the

state of the art, the Handbook of Enumerative Combinatorics brings together the work of today's most prominent researchers. The contributors survey the methods of combinatorial enumeration

along with the most frequent applications of these methods. This important new work is edited by Miklós Bóna of the University of Florida where he is a member of the Academy of Distinguished Teaching Scholars. He received his Ph.D. in mathematics at Massachusetts Institute of Technology in 1997. Miklós is the author of four books and more than 65 research articles, including the award-winning *Combinatorics of Permutations*. Miklós Bóna is an editor-in-chief for the *Electronic Journal of Combinatorics* and Series Editor of the *Discrete Mathematics and Its Applications* Series for CRC Press/Chapman and Hall. The first two chapters provide a comprehensive overview of the most frequently used methods in combinatorial enumeration, including algebraic, geometric, and analytic methods. These chapters survey generating functions, methods from linear algebra, partially ordered sets, polytopes, hyperplane arrangements, and matroids. Subsequent chapters illustrate applications of these methods for counting a wide array of objects. The contributors for this book represent an international spectrum of researchers with strong histories of results. The chapters are organized so readers advance from the more general ones, namely enumeration methods, towards the more specialized ones. Topics include coverage of asymptotic normality in enumeration, planar maps, graph enumeration, Young tableaux, unimodality, log-concavity, real zeros, asymptotic normality, trees, generalized Catalan paths, computerized enumeration schemes, enumeration of various graph classes, words, tilings, pattern avoidance, computer algebra, and parking functions. This book will be beneficial to a wide audience. It will appeal to experts on the topic interested in learning more about the finer points, readers interested in a systematic and organized treatment of the topic, and novices who are new to the field.

Issues in General and Specialized Mathematics Research: 2011 Edition

2012-01-09 Issues in General and

Specialized Mathematics Research: 2011 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about General and Specialized Mathematics Research. The editors have built Issues in General and Specialized Mathematics Research: 2011 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about General and Specialized Mathematics Research in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in General and Specialized Mathematics Research: 2011 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at <http://www.ScholarlyEditions.com/>.

Statistical Challenges in Modern Astronomy V Eric D. Feigelson 2012-08-15 This volume contains a selection of chapters based on papers to be presented at the Fifth Statistical Challenges in Modern Astronomy Symposium. The symposium will be held June 13-15th at Penn State University. Modern astronomical research faces a vast range of statistical issues which have spawned a revival in methodological activity among astronomers. The Statistical Challenges in Modern Astronomy V conference will bring astronomers and statisticians together to discuss methodological issues of common interest. Time series analysis, image analysis, Bayesian methods, Poisson processes, nonlinear regression, maximum likelihood, multivariate classification, and wavelet and multiscale analyses are all important themes to be covered in detail. Many problems will be introduced at the conference in the context of large-scale astronomical projects including LIGO,

AXAF, XTE, Hipparcos, and digitized sky surveys.

Foundations and Frontiers in Computer, Communication and Electrical Engineering Aritra Acharyya 2016-05-05 The 3rd International Conference on Foundations and Frontiers in Computer, Communication and Electrical Engineering is a notable event which brings together academia, researchers, engineers and students in the fields of Electronics and Communication, Computer and Electrical Engineering making the conference a perfect platform to share experience, f
Fulltext Sources Online 2007

Topics in Numerical Partial Differential Equations and Scientific Computing Susanne C. Brenner 2016-08-26 Numerical partial differential equations (PDEs) are an important part of numerical simulation, the third component of the modern methodology for science and engineering, besides the traditional theory and experiment. This volume contains papers that originated with the collaborative research of the teams that participated in the IMA Workshop for Women in Applied Mathematics: Numerical Partial Differential Equations and Scientific Computing in August 2014.

Proceedings of the Conference on Differential & Difference Equations and Applications Ravi P. Agarwal 2006
Advanced Applications of Fractional Differential Operators to Science and Technology Matouk, Ahmed Ezzat 2020-04-24 Fractional-order calculus dates to the 19th century but has been resurrected as a prevalent research subject due to its provision of more adequate and realistic descriptions of physical aspects within the science and engineering fields. What was once a classical form of mathematics is currently being reintroduced as a new modeling technique that engineers and scientists are finding modern uses for. There is a need for research on all facets of these fractional-order systems and studies of its potential applications. *Advanced Applications of Fractional Differential Operators to Science*

and Technology provides emerging research exploring the theoretical and practical aspects of novel fractional modeling and related dynamical behaviors as well as its applications within the fields of physical sciences and engineering. Featuring coverage on a broad range of topics such as chaotic dynamics, ecological models, and bifurcation control, this book is ideally designed for engineering professionals, mathematicians, physicists, analysts, researchers, educators, and students seeking current research on fractional calculus and other applied mathematical modeling techniques.

Random Fields on the Sphere Domenico Marinucci 2011-08-25 Random Fields on the Sphere presents a comprehensive analysis of isotropic spherical random fields. The main emphasis is on tools from harmonic analysis, beginning with the representation theory for the group of rotations $SO(3)$. Many recent developments on the method of moments and cumulants for the analysis of Gaussian subordinated fields are reviewed. This background material is used to analyse spectral representations of isotropic spherical random fields and then to investigate in depth the properties of associated harmonic coefficients. Properties and statistical estimation of angular power spectra and polyspectra are addressed in full. The authors are strongly motivated by cosmological applications, especially the analysis of cosmic microwave background (CMB) radiation data, which has initiated a challenging new field of mathematical and statistical research. Ideal for mathematicians and statisticians interested in applications to cosmology, it will also interest cosmologists and mathematicians working in group representations, stochastic calculus and spherical wavelets.

Impulsive Differential Equations and Inclusions 2006

Computational Science and Technology Rayner Alfred 2019-08-29 This book gathers the proceedings of the Sixth International Conference on Computational Science and Technology 2019 (ICCST2019),

held in Kota Kinabalu, Malaysia, on 29–30 August 2019. The respective contributions offer practitioners and researchers a range of new computational techniques and solutions, identify emerging issues, and outline future research directions, while also showing them how to apply the latest large-scale, high-performance computational methods.

Distributions in the Physical and Engineering Sciences, Volume 3 Alexander I. Saichev 2018-08-03 Continuing the authors' multivolume project, this text considers the theory of distributions from an applied perspective, demonstrating how effective a combination of analytic and probabilistic methods can be for solving problems in the physical and engineering sciences. Volume 1 covered foundational topics such as distributional and fractional calculus, the integral transform, and wavelets, and Volume 2 explored linear and nonlinear dynamics in continuous media. With this volume, the scope is extended to the use of distributional tools in the theory of generalized stochastic processes and fields, and in anomalous fractional random dynamics. Chapters cover topics such as probability distributions; generalized stochastic processes, Brownian motion, and the white noise; stochastic differential equations and generalized random fields; Burgers turbulence and passive tracer transport in Burgers flows; and linear, nonlinear, and multiscale anomalous fractional dynamics in continuous media. The needs of the applied-sciences audience are addressed by a careful and rich selection of examples arising in real-life industrial and scientific labs and a thorough discussion of their physical significance. Numerous illustrations generate a better understanding of the core concepts discussed in the text, and a large number of exercises at the end of each chapter expand on these concepts. Distributions in the Physical and Engineering Sciences is intended to fill a gap in the typical undergraduate engineering/physical sciences curricula, and as such it will be a valuable resource for researchers and

graduate students working in these areas. The only prerequisites are a three-four semester calculus sequence (including ordinary differential equations, Fourier series, complex variables, and linear algebra), and some probability theory, but basic definitions and facts are covered as needed. An appendix also provides background material concerning the Dirac-delta and other distributions.

Handbook of Means and Their Inequalities

P.S. Bullen 2013-04-17 There seems to be two types of books on inequalities. On the one hand there are treatises that attempt to cover all or most aspects of the subject, and where an attempt is made to give all results in their best possible form, together with either a full proof or a sketch of the proof together with references to where a full proof can be found. Such books, aimed at the professional pure and applied mathematician, are rare. The first such, that brought some order to this untidy field, is the classical "Inequalities" of Hardy, Littlewood & Pólya, published in 1934. Important as this outstanding work was and still is, it made no attempt at completeness; rather it consisted of the total knowledge of three front rank mathematicians in a field in which each had made fundamental contributions. Extensive as this combined knowledge was there were inevitably certain lacunae; some important results, such as Steffensen's inequality, were not mentioned at all; the works of certain schools of mathematicians were omitted, and many important ideas were not developed, appearing as exercises at the ends of chapters. The later book "Inequalities" by Beckenbach & Bellman, published in 1961, repairs many of these omissions. However this last book is far from a complete coverage of the field, either in depth or scope.

Delay Differential Equations and Applications

O. Arino 2007-01-07 This book groups material that was used for the Marrakech 2002 School on Delay Differential Equations and Applications. The school was held from September 9-21 2002 at the Semlalia College of Sciences of the

Cadi Ayyad University, Marrakech, Morocco. 47 participants and 15 instructors originating from 21 countries attended the school. Financial limitations only allowed support for part of the people from Africa and Asia who had expressed their interest in the school and had hoped to come.

The school was supported by ?ancements from NATO-ASI (Nato advanced School), the International Centre of Pure and Applied Mathematics (CIMPA, Nice, France) and Cadi Ayyad University. The activity of the school consisted in courses, plenary lectures (3) and communications (9), from Monday through Friday, 8. 30 am to 6. 30 pm. Courses were divided into units of 45mn duration, taught by block of two units, with a short 5mn break between two units within a block, and a 25mn break between two blocks. The school was intended for mathematicians willing to acquire some familiarity with delay differential equations or enhance their knowledge on this subject. The aim was indeed to extend the basic set of knowledge, including ordinary differential equations and semilinear evolution equations, such as for example the diffusion-reaction equations arising in morphogenesis or the Belousov-Zhabotinsky chemical reaction, and the classic approach for the resolution of these equations by perturbation, to equations having in addition terms involving past values of the solution.

Functional Differential Equations

Constantin Corduneanu 2016-04-11 Features new results and up-to-date advances in modeling and solving differential equations Introducing the various classes of functional differential equations, Functional Differential Equations: Advances and Applications presents the needed tools and topics to study the various classes of functional differential equations and is primarily concerned with the existence, uniqueness, and estimates of solutions to specific problems. The book focuses on the general theory of functional differential equations, provides the requisite mathematical

background, and details the qualitative behavior of solutions to functional differential equations. The book addresses problems of stability, particularly for ordinary differential equations in which the theory can provide models for other classes of functional differential equations, and the stability of solutions is useful for the application of results within various fields of science, engineering, and economics. **Functional Differential Equations: Advances and Applications** also features:

- Discussions on the classes of equations that cannot be solved to the highest order derivative, and in turn, addresses existence results and behavior types
- Oscillatory motion and solutions that occur in many real-world phenomena as well as in man-made machines
- Numerous examples and applications with a specific focus on ordinary differential equations and functional differential equations with finite delay
- An appendix that introduces generalized Fourier series and Fourier analysis after periodicity and almost periodicity
- An extensive Bibliography with over 550 references that connects the presented concepts to further topical exploration

Functional Differential Equations: Advances and Applications is an ideal reference for academics and practitioners in applied mathematics, engineering, economics, and physics. The book is also an appropriate textbook for graduate- and PhD-level courses in applied mathematics, differential and difference equations, differential analysis, and dynamics processes.

CONSTANTIN CORDUNEANU, PhD, is Emeritus Professor in the Department of Mathematics at The University of Texas at Arlington, USA. The author of six books and over 200 journal articles, he is currently Associate Editor for seven journals; a member of the American Mathematical Society, Society for Industrial and Applied Mathematics, and the Romanian Academy; and past president of the American Romanian Academy of Arts and Sciences.

YIZENG LI, PhD, is Professor in the Department of Mathematics at Tarrant County College, USA. He is a

member of the Society for Industrial and Applied Mathematics. **MEHRAN MAHDAVI**, PhD, is Professor in the Department of Mathematics at Bowie State University, USA. The author of numerous journal articles, he is a member of the American Mathematical Society, Society for Industrial and Applied Mathematics, and the Mathematical Association of America.

Nonstandard Methods and Applications in Mathematics Nigel J. Cutland

2017-03-30 Since their inception, the Perspectives in Logic and Lecture Notes in Logic series have published seminal works by leading logicians. Many of the original books in the series have been unavailable for years, but they are now in print once again. This volume, the twenty-fifth publication in the Lecture Notes in Logic series, grew from a conference on Nonstandard Methods and Applications in Mathematics held in Pisa, Italy from 12-16 June, 2002. It contains ten peer-reviewed papers that aim to provide something more timely than a textbook, but less ephemeral than a conventional proceedings.

Nonstandard analysis is one of the great achievements of modern applied mathematical logic. These articles consider the foundations of the subject, as well as its applications to pure and applied mathematics and mathematics education.

Nonautonomous Dynamical Systems

Peter E. Kloeden 2011-08-17 The theory of nonautonomous dynamical systems in both of its formulations as processes and skew product flows is developed systematically in this book. The focus is on dissipative systems and nonautonomous attractors, in particular the recently introduced concept of pullback attractors. Linearization theory, invariant manifolds, Lyapunov functions, Morse decompositions and bifurcations for nonautonomous systems and set-valued generalizations are also considered as well as applications to numerical approximations, switching systems and synchronization. Parallels with corresponding theories of control and random dynamical systems are briefly sketched. With its clear and systematic

exposition, many examples and exercises, as well as its interesting applications, this book can serve as a text at the beginning graduate level. It is also useful for those who wish to begin their own independent research in this rapidly developing area.

International Journal of Mathematical Combinatorics, Volume 3, 2016 Linfan Mao

The mathematical combinatorics is a subject that applying combinatorial notion to all mathematics and all sciences for understanding the reality of things in the universe. The International J. Mathematical Combinatorics is a fully refereed international journal, sponsored by the MADIS of Chinese Academy of Sciences and published in USA quarterly, which publishes original research papers and survey articles in all aspects of mathematical combinatorics, Smarandache multi-spaces, Smarandache geometries, non-Euclidean geometry, topology and their applications to other sciences.

Oscillators Patrice Salzenstein 2019-06-26

An oscillator is dedicated to the generation of signals. It is used in computers, telecoms, watchmaking, astronomy, and metrology. It can be a pendulum, an electronic oscillator based on quartz technology, an optoelectronic oscillator, or an atomic clock, depending on its application. Since water clocks of antiquity, mechanical clocks invented during the thirteenth century, and the discovery of piezoelectricity by Jacques and Pierre Curie in 1880, oscillators have made great progress. This book does not attempt to tell the story of oscillators, but rather provides an overview of particular oscillator structures through examples from mathematics to oscillators, and from the millimeter scale to the vibration of a building, focusing on recent developments, as we live in a time when technology and mathematical analysis play a vital role.

Recent Advances in Contact Mechanics Georgios E. Stavroulakis 2012-10-19

Contact mechanics is an active research area with deep theoretical and numerical roots. The links between nonsmooth analysis and optimization with mechanics

have been investigated intensively during the last decades, especially in Europe. The study of complementarity problems, variational -, quasivariational- and hemivariational inequalities arising in contact mechanics and beyond is a hot topic for interdisciplinary research and cooperation. The needs of industry for robust solution algorithms suitable for large scale applications and the regular updates of the respective elements in major commercial computational mechanics codes, demonstrate that this interaction is not restricted to the academic environment. The contributions of this book have been selected from the participants of the CMIS 2009 international conference which took place in Crete and continued a successful series of specialized contact mechanics conferences.

Invariant Manifolds for Physical and Chemical Kinetics Alexander N. Gorban 2005-02-01

By bringing together various ideas and methods for extracting the slow manifolds, the authors show that it is possible to establish a more macroscopic description in nonequilibrium systems. The book treats slowness as stability. A unifying geometrical viewpoint of the thermodynamics of slow and fast motion enables the development of reduction techniques, both analytical and numerical. Examples considered in the book range from the Boltzmann kinetic equation and hydrodynamics to the Fokker-Planck equations of polymer dynamics and models of chemical kinetics describing oxidation reactions. Special chapters are devoted to model reduction in classical statistical dynamics, natural selection, and exact solutions for slow hydrodynamic manifolds. The book will be a major reference source for both theoretical and applied model reduction. Intended primarily as a postgraduate-level text in nonequilibrium kinetics and model reduction, it will also be valuable to PhD students and researchers in applied mathematics, physics and various fields of engineering.

Group Inverses of M-Matrices and Their Applications Stephen J. Kirkland

2012-12-18 Group inverses for singular M-matrices are useful tools not only in matrix analysis, but also in the analysis of stochastic processes, graph theory, electrical networks, and demographic models. *Group Inverses of M-Matrices and Their Applications* highlights the importance and utility of the group inverses of M-matrices in several application areas. After introducing sample problems associated with Leslie matrices and stochastic matrices, the authors develop the basic algebraic and spectral properties of the group inverse of a general matrix. They then derive formulas for derivatives of matrix functions and apply the formulas to matrices arising in a demographic setting, including the class of Leslie matrices. With a focus on Markov chains, the text shows how the group inverse of an appropriate M-matrix is used in the perturbation analysis of the stationary distribution vector as well as in the derivation of a bound for the asymptotic convergence rate of the underlying Markov chain. It also illustrates how to use the group inverse to compute and analyze the mean first passage matrix for a Markov chain. The final chapters focus on the Laplacian matrix for an undirected graph and compare approaches for computing the group inverse. Collecting diverse results into a single volume, this self-contained book emphasizes the connections between problems arising in Markov chains, Perron eigenvalue analysis, and spectral graph theory. It shows how group inverses offer valuable insight into each of these areas.

ITJEMAST 10(12) 2019 International Transaction Journal of Engineering, Management, & Applied Sciences & Technologies publishes a wide spectrum of research and technical articles as well as reviews, experiments, experiences, modelings, simulations, designs, and innovations from engineering, sciences, life sciences, and related disciplines as well as interdisciplinary/cross-disciplinary/multidisciplinary subjects. Original work is required. Article submitted must not be under consideration of other

publishers for publications.

MATHEMATICAL COMBINATORICS (INTERNATIONAL BOOK SERIES), Vol. 2, 2020 Linfan Mao The mathematical combinatorics is a subject that applying combinatorial notions to all mathematics and all sciences for understanding the reality of things in the universe, motivated by CC Conjecture of Dr. Linfan MAO on mathematical sciences. The International J. Mathematical Combinatorics (ISSN 1937-1055) is a fully refereed international journal, sponsored by the MADIS of Chinese Academy of Sciences and published in USA quarterly, which publishes original research papers and survey articles in all aspects of mathematical combinatorics, Smarandache multi-spaces, Smarandache geometries, non-Euclidean geometry, topology and their applications to other sciences.

Discontinuity, Nonlinearity, and Complexity Lev Ostrovsky 2018-07-01 The interdisciplinary journal publishes original and new results on recent developments, discoveries and progresses on Discontinuity, Nonlinearity and Complexity in physical and social sciences. The aim of the journal is to stimulate more research interest for exploration of discontinuity, complexity, nonlinearity and chaos in complex systems. The manuscripts in dynamical systems with nonlinearity and chaos are solicited, which includes mathematical theories and methods, physical principles and laws, and computational techniques. The journal provides a place to researchers for the rapid exchange of ideas and techniques in discontinuity, complexity, nonlinearity and chaos in physical and social sciences. No length limitations for contributions are set, but only concisely written manuscripts are published. Brief papers are published on the basis of Technical Notes. Discussions of previous published papers are welcome. Topics of Interest Complex and hybrid dynamical systemsDiscontinuous dynamical systems (i.e., impulsive, time-delay, flow barriers)Nonlinear discrete systems and symbolic dynamicsFractional dynamical

systems and control
Stochastic dynamical systems and randomness
Complexity, self-similarity and synchronization in nonlinear physics
Nonlinear phenomena and physical mechanisms
Stability, bifurcation and chaos in complex systems
Hydrodynamics, turbulence and complexity
mechanism
Nonlinear waves and soliton
Dynamical networks
Combinatorial aspects of dynamical systems
Biological dynamics and biophysics

Hadamard-Type Fractional Differential Equations, Inclusions and Inequalities

Bashir Ahmad 2017-03-16 This book focuses on the recent development of fractional differential equations, integro-differential equations, and inclusions and inequalities involving the Hadamard derivative and integral. Through a comprehensive study based in part on their recent research, the authors address the issues related to initial and boundary value problems involving Hadamard type differential equations and inclusions as well as their functional counterparts. The book covers fundamental concepts of multivalued analysis and introduces a new class of mixed initial value problems involving the Hadamard derivative and Riemann-Liouville fractional integrals. In later chapters, the authors discuss nonlinear Langevin equations as well as coupled systems of Langevin equations with fractional integral conditions. Focused and thorough, this book is a useful resource for readers and researchers interested in the area of

fractional calculus.

Studies in Evolution Equations and Related Topics

Gaston M. N'Guérékata 2021-10-27 This volume features recent development and techniques in evolution equations by renown experts in the field. Each contribution emphasizes the relevance and depth of this important area of mathematics and its expanding reach into the physical, biological, social, and computational sciences as well as into engineering and technology. The reader will find an accessible summary of a wide range of active research topics, along with exciting new results. Topics include: Impulsive implicit Caputo fractional q -difference equations in finite and infinite dimensional Banach spaces; optimal control of averaged state of a population dynamic model; structural stability of nonlinear elliptic $p(u)$ -Laplacian problem with Robin-type boundary condition; exponential dichotomy and partial neutral functional differential equations, stable and center-stable manifolds of admissible class; global attractor in Alpha-norm for some partial functional differential equations of neutral and retarded type; and more. Researchers in mathematical sciences, biosciences, computational sciences and related fields, will benefit from the rich and useful resources provided. Upper undergraduate and graduate students may be inspired to contribute to this active and stimulating field.