Gockenbach Partial Differential Equations 2nd Edition

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Computational Mathematics - Robert E. White 2015-11-11 Computational Mathematics: Models, Methods, and Analysis with MATLAB and MPI is a unique book covering the concepts and techniques at the core of computational science. The author delivers a hands-on introduction to nonlinear, 2D, and 3D models; nonrectangular domains; systems of partial differential equations; and large algebraic problems requirin

An Introduction to Partial Differential Equations - Michael Renardy 2006-04-18 Partial differential equations are fundamental to the

modeling of natural phenomena. The desire to understand the solutions of these equations has always had a prominent place in the efforts of mathematicians and has inspired such diverse fields as complex function theory, functional analysis, and algebraic topology. This book, meant for a beginning graduate audience, provides a thorough introduction to partial differential equations.

Power Transformer Diagnostics, Monitoring and Design Features - Issouf Fofana, Ph.D. ing. Chairholder 2019-01-09

This book is a printed edition of the Special Issue "Power Transformer Diagnostics, Monitoring and Design Features" that was published in Energies

An Introduction to Partial Differential Equations with MATLAB - Matthew P. Coleman 2016-04-19

An Introduction to Partial Differential Equations with MATLAB, Second Edition illustrates the usefulness of PDEs through numerous applications and helps students appreciate the beauty of the underlying mathematics. Updated throughout, this second edition of a bestseller shows students how PDEs can model diverse problems, including the flow of heat,

Matrix Analysis for Scientists and Engineers - Alan J. Laub 2005-01-01

"Prerequisites for using this text are knowledge of calculus and some previous exposure to matrices and linear algebra, including, for example, a basic knowledge of determinants, singularity of matrices, eigenvalues and eigenvectors, and positive definite matrices. There are exercises at the end of each chapter."--BOOK JACKET.

Novel Finite Element Technologies for Solids and Structures - Jörg Schröder 2019-11-26

This book presents new ideas in the framework of novel, finite element discretization schemes for solids and structure, focusing on the mechanical as well as the mathematical background. It

also explores the implementation and automation aspects of these technologies. Furthermore, the authors highlight recent developments in mixed finite element formulations in solid mechanics as well as novel techniques for flexible structures at finite deformations. The book also describes automation processes and the application of automatic differentiation technique, including characteristic problems, automatic code generation and code optimization. The combination of these approaches leads to highly efficient numerical codes, which are fundamental for reliable simulations of complicated engineering problems. These techniques are used in a wide range of applications from elasticity, viscoelasticity, plasticity, and viscoplasticity in classical engineering disciplines, such as civil and mechanical engineering, as well as in modern branches like biomechanics and multiphysics.

Programming Projects in C for Students of Engineering, Science, and Mathematics - Rouben Rostamian 2014-09-03 Like a pianist who practices from a book of études, readers of Programming Projects in C for Students of Engineering, Science, and Mathematics will learn by doing. Written as a tutorial on how to think about, organize, and implement programs in scientific computing, this book achieves its goal through an eclectic and wide-ranging collection of projects. Each project presents a problem and an algorithm for solving it. The reader is guided through implementing the algorithm in C and compiling and testing the results. It is not necessary to carry out the projects in sequential order. The projects contain suggested algorithms and partially completed programs for implementing them to enable the reader to exercise and develop skills in scientific computing; require only a working knowledge of undergraduate multivariable calculus, differential equations,

and linear algebra; and are written in platform-independent standard C; the Unix command-line is used to illustrate compilation and execution.

Uncertainty Quantification - Ralph C. Smith 2013-12-02

The field of uncertainty quantification is evolving rapidly because of increasing emphasis on models that require quantified uncertainties for large-scale applications, novel algorithm development, and new computational architectures that facilitate implementation of these algorithms. Uncertainty Quantification: Theory, Implementation, and Applications provides readers with the basic concepts, theory, and algorithms necessary to quantify input and response uncertainties for simulation models arising in a broad range of disciplines. The book begins with a detailed discussion of applications where uncertainty quantification is critical for both scientific understanding and policy. It then covers concepts from probability and statistics, parameter selection techniques, frequentist and Bayesian model calibration, propagation of uncertainties, quantification of model discrepancy, surrogate model construction, and local and global sensitivity analysis. The author maintains a complementary web page where readers can find data used in the exercises and other supplementary material.

Linear Inverse Problems and Tikhonov Regularization - Mark S. Gockenbach 2016-12-31

Inverse problems occur frequently in science and technology, whenever we need to infer causes from effects that we can measure. Mathematically, they are difficult problems because they are unstable: small bits of noise in the measurement can completely throw off the solution. Nevertheless, there are methods for finding good approximate solutions. Linear Inverse Problems and Tikhonov Regularization examines one such method: Tikhonov

regularization for linear inverse problems defined on Hilbert spaces. This is a clear example of the power of applying deep mathematical theory to solve practical problems. Beginning with a basic analysis of Tikhonov regularization, this book introduces the singular value expansion for compact operators, and uses it to explain why and how the method works. Tikhonov regularization with seminorms is also analyzed, which requires introducing densely defined unbounded operators and their basic properties. Some of the relevant background is included in appendices, making the book accessible to a wide range of readers.

Linear and Nonlinear Functional Analysis with Applications - Philippe G. Ciarlet 2013-10-10

This single-volume textbook covers the fundamentals of linear and nonlinear functional analysis, illustrating most of the basic theorems with numerous applications to linear and nonlinear partial differential equations and to selected topics from numerical analysis and optimization theory. This book has pedagogical appeal because it features self-contained and complete proofs of most of the theorems, some of which are not always easy to locate in the literature or are difficult to reconstitute. It also offers 401 problems and 52 figures, plus historical notes and many original references that provide an idea of the genesis of the important results, and it covers most of the core topics from functional analysis.

Finite Difference Methods for Ordinary and Partial Differential Equations - Randall J. LeVeque 2007-01-01

This book introduces finite difference methods for both ordinary differential equations (ODEs) and partial differential equations (PDEs) and discusses the similarities and differences between algorithm design and stability analysis for different types of equations. A unified view of stability theory for ODEs and PDEs is presented,

and the interplay between ODE and PDE analysis is stressed. The text emphasizes standard classical methods, but several newer approaches also are introduced and are described in the context of simple motivating examples.

The Finite Element Method: Theory, Implementation, and Applications Mats G. Larson 2013-01-13

This book gives an introduction to the finite element method as a general computational method for solving partial differential equations approximately. Our approach is mathematical in nature with a strong focus on the underlying mathematical principles, such as approximation properties of piecewise polynomial spaces, and variational formulations of partial differential equations, but with a minimum level of advanced mathematical machinery from functional analysis and partial differential equations. In principle, the material should be accessible to students with only knowledge of calculus of several variables, basic partial differential equations, and linear algebra, as the necessary concepts from more advanced analysis are introduced when needed. Throughout the text we emphasize implementation of the involved algorithms, and have therefore mixed mathematical theory with concrete computer code using the numerical software MATLAB is and its PDE-Toolbox. We have also had the ambition to cover some of the most important applications of finite elements and the basic finite element methods developed for those applications, including diffusion and transport phenomena, solid and fluid mechanics, and also electromagnetics.

Introduction To Numerical Computation, An (Second Edition) - Wen Shen 2019-08-28

This book serves as a set of lecture notes for a senior undergraduate level course on the introduction to numerical computation, which was developed through 4 semesters

of teaching the course over 10 years. The book requires minimum background knowledge from the students, including only a three-semester of calculus, and a bit on matrices.The book covers many of the introductory topics for a first course in numerical computation, which fits in the short time frame of a semester course. Topics range from polynomial approximations and interpolation, to numerical methods for ODEs and PDEs. Emphasis was made more on algorithm development, basic mathematical ideas behind the algorithms, and the implementation in Matlab.The book is supplemented by two sets of videos, available through the author's YouTube channel. Homework problem sets are provided for each chapter, and complete answer sets are available for instructors upon request.The second edition contains a set of selected advanced topics, written in a self-contained manner, suitable for self-learning or as additional material for an honored version of the course. Videos are also available for these added topics.

Applied Differential Equations - Vladimir A. Dobrushkin 2014-12-16

A Contemporary Approach to Teaching Differential Equations Applied Differential Equations: An Introduction presents a contemporary treatment of ordinary differential equations (ODEs) and an introduction to partial differential equations (PDEs), including their applications in engineering and the sciences. Designed for a two-semester undergraduate course, the text offers a true alternative to books published for past generations of students. It enables students majoring in a range of fields to obtain a solid foundation in differential equations. The text covers traditional material, along with novel approaches to mathematical modeling that harness the capabilities of numerical algorithms and popular computer software packages. It contains practical techniques for solving the

equations as well as corresponding codes for numerical solvers. Many examples and exercises help students master effective solution techniques, including reliable numerical approximations. This book describes differential equations in the context of applications and presents the main techniques needed for modeling and systems analysis. It teaches students how to formulate a mathematical model, solve differential equations analytically and numerically, analyze them qualitatively, and interpret the results.

Finite-Dimensional Linear Algebra - Mark S. Gockenbach 2011-06-15

Linear algebra forms the basis for much of modern mathematics—theoretical, applied, and computational. Finite-Dimensional Linear Algebra provides a solid foundation for the study of advanced mathematics and discusses applications of linear algebra to such diverse areas as combinatorics, differential equations, optimization, and approximation. The author begins with an overview of the essential themes of the book: linear equations, best approximation, and diagonalization. He then takes students through an axiomatic development of vector spaces, linear operators, eigenvalues, norms, and inner products. In addition to discussing the special properties of symmetric matrices, he covers the Jordan canonical form, an important theoretical tool, and the singular value decomposition, a powerful tool for computation. The final chapters present introductions to numerical linear algebra and analysis in vector spaces, including a brief introduction to functional analysis (infinite-dimensional linear algebra). Drawing on material from the author's own course, this textbook gives students a strong theoretical understanding of linear algebra. It offers many illustrations of how linear algebra is used throughout mathematics.

The Gradient Discretisation

Method - Jérôme Droniou 2018-07-31
This monograph presents the Gradient Discretisation Method (GDM), which is a unified convergence analysis framework for numerical methods for elliptic and parabolic partial differential equations. The results obtained by the GDM cover both stationary and transient models; error estimates are provided for linear (and some non-linear) equations, and convergence is established for a wide range of fully non-linear models (e.g. Leray–Lions equations and degenerate parabolic equations such as the Stefan or Richards models). The GDM applies to a diverse range of methods, both classical (conforming, non-conforming, mixed finite elements, discontinuous Galerkin) and modern (mimetic finite differences, hybrid and mixed finite volume, MPFA-O finite volume), some of which can be built on very general meshes.span style="" ms="" mincho";mso-bidi-font-family:="" the="" core="" properties="" and="" analytical="" tools="" required="" to="" work="" within="" gdm="" are="" stressed,="" it="" is="" shown="" that="" scheme="" convergence="" can="" often="" be="" established="" by="" verifying="" a="" small="" number="" of="" properties.="" scope="" some="" featured="" techniques="" results,="" such="" as="" time-space="" compactness="" theorems="" (discrete="" aubin–simon,="" discontinuous="" ascoli–arzela),="" goes="" beyond="" gdm,="" making="" them="" potentially="" applicable="" numerical="" schemes="" not="" (yet)="" known="" fit="" into="" this="" framework.span style="font-family:" ms="" mincho";mso-bidi-font-family:="" this="" monograph="" is="" intended="" for="" graduate="" students,="" researchers="" and="" experts="" in="" the="" field="" of="" numerical="" analysis="" partial=""

differential="" equations./ppiiiiibr/i/i/i/i/p

Scientific Computing - Michael T. Heath 2018-11-14

This book differs from traditional numerical analysis texts in that it focuses on the motivation and ideas behind the algorithms presented rather than on detailed analyses of them. It presents a broad overview of methods and software for solving mathematical problems arising in computational modeling and data analysis, including proper problem formulation, selection of effective solution algorithms, and interpretation of results.? In the 20 years since its original publication, the modern, fundamental perspective of this book has aged well, and it continues to be used in the classroom. This Classics edition has been updated to include pointers to Python software and the Chebfun package, expansions on barycentric formulation for Lagrange polynomial interpretation and stochastic methods, and the availability of about 100 interactive educational modules that dynamically illustrate the concepts and algorithms in the book. Scientific Computing: An Introductory Survey, Second Edition is intended as both a textbook and a reference for computationally oriented disciplines that need to solve mathematical problems.

Numerical Mathematics and Computing - E. Ward Cheney 2012-05-15

Authors Ward Cheney and David Kincaid show students of science and engineering the potential computers have for solving numerical problems and give them ample opportunities to hone their skills in programming and problem solving. NUMERICAL MATHEMATICS AND COMPUTING, 7th Edition also helps students learn about errors that inevitably accompany scientific computations and arms them with methods for detecting, predicting, and controlling these errors. Important Notice: Media content referenced within the product description or the product text may not be

available in the ebook version.

Numerical Computations with GPUs - Volodymyr Kindratenko 2014-07-03

This book brings together research on numerical methods adapted for Graphics Processing Units (GPUs). It explains recent efforts to adapt classic numerical methods, including solution of linear equations and FFT, for massively parallel GPU architectures. This volume consolidates recent research and adaptations, covering widely used methods that are at the core of many scientific and engineering computations. Each chapter is written by authors working on a specific group of methods; these leading experts provide mathematical background, parallel algorithms and implementation details leading to reusable, adaptable and scalable code fragments. This book also serves as a GPU implementation manual for many numerical algorithms, sharing tips on GPUs that can increase application efficiency. The valuable insights into parallelization strategies for GPUs are supplemented by ready-to-use code fragments. Numerical Computations with GPUs targets professionals and researchers working in high performance computing and GPU programming. Advanced-level students focused on computer science and mathematics will also find this book useful as secondary text book or reference.

American Book Publishing Record - 2003

The Architecture of Scientific Software - Ronald F. Boisvert 2013-04-17

Scientific applications involve very large computations that strain the resources of whatever computers are available. Such computations implement sophisticated mathematics, require deep scientific knowledge, depend on subtle interplay of different approximations, and may be subject to instabilities and sensitivity to external input. Software able to succeed in this domain invariably embeds significant domain knowledge

that should be tapped for future use. Unfortunately, most existing scientific software is designed in an ad hoc way, resulting in monolithic codes understood by only a few developers. Software architecture refers to the way software is structured to promote objectives such as reusability, maintainability, extensibility, and feasibility of independent implementation. Such issues have become increasingly important in the scientific domain, as software gets larger and more complex, constructed by teams of people, and evolved over decades. In the context of scientific computation, the challenge facing mathematical software practitioners is to design, develop, and supply computational components which deliver these objectives when embedded in end-user application codes. The Architecture of Scientific Software addresses emerging methodologies and tools for the rational design of scientific software, including component integration frameworks, network-based computing, formal methods of abstraction, application programmer interface design, and the role of object-oriented languages. This book comprises the proceedings of the International Federation for Information Processing (IFIP) Conference on the Architecture of Scientific Software, which was held in Ottawa, Canada, in October 2000. It will prove invaluable reading for developers of scientific software, as well as for researchers in computational sciences and engineering.

The Radon Transform, Inverse Problems, and Tomography - Gestur Ólafsson 2006

Since their emergence in 1917, tomography and inverse problems remain active and important fields that combine pure and applied mathematics and provide strong interplay between diverse mathematical problems and applications. The applied side is best known for medical and scientific use, in particular, medical imaging, radiotherapy, and industrial

non-destructive testing. Doctors use tomography to see the internal structure of the body or to find functional information, such as metabolic processes, noninvasively. Scientists discover defects in objects, the topography of the ocean floor, and geological information using X-rays, geophysical measurements, sonar, or other data.This volume, based on the lectures in the Short Course The Radon Transform and Applications to Inverse Problems at the American Mathematical Society meeting in Atlanta, GA, January 3-4, 2005, brings together articles on mathematical aspects of tomography and related inverse problems. The articles cover introductory material, theoretical problems, and practical issues in 3-D tomography, impedance imaging, local tomography, wavelet methods, regularization and approximate inverse, sampling, and emission tomography. All contributions are written for a general audience, and the authors have included references for further reading.

Partial Differential Equations - Mark S. Gockenbach 2010-12-02

A fresh, forward-looking undergraduate textbook that treats the finite element method and classical Fourier series method with equal emphasis.

High Performance Computing in Science and Engineering Tomáš Kozubek 2016-06-02

This book constitutes the thoroughly refereed post-conference proceedings of the Second International Conference on High Performance Computing in Science and Engineering, HPCSE 2015, held in Soláň, Czech Republic, in May 2015. The 14 papers presented in this volume were carefully reviewed and selected from 21 submissions. The conference provides an international forum for exchanging ideas among researchers involved in scientific and parallel computing, including theory and applications, as well as applied and computational

mathematics. The focus of HPCSE 2015 was on models, algorithms, and software tools which facilitate efficient and convenient utilization of modern parallel and distributed computing architectures, as well as on large-scale applications. Mathematical Reviews - 2008

Solving PDEs in Python - Hans Petter Langtangen 2017-03-21

This book offers a concise and gentle introduction to finite element programming in Python based on the popular FEniCS software library. Using a series of examples, including the Poisson equation, the equations of linear elasticity, the incompressible Navier–Stokes equations, and systems of nonlinear advection–diffusion–reaction equations, it guides readers through the essential steps to quickly solving a PDE in FEniCS, such as how to define a finite variational problem, how to set boundary conditions, how to solve linear and nonlinear systems, and how to visualize solutions and structure finite element Python programs. This book is open access under a CC BY license.

A Taste of Inverse Problems - Martin Hanke 2017-01-01

Inverse problems need to be solved in order to properly interpret indirect measurements. Often, inverse problems are ill-posed and sensitive to data errors. Therefore one has to incorporate some sort of regularization to reconstruct significant information from the given data. This book presents the main achievements that have emerged in regularization theory over the past 50 years, focusing on linear ill-posed problems and the development of methods that can be applied to them. Some of this material has previously appeared only in journal articles. A Taste of Inverse Problems: Basic Theory and Examples rigorously discusses state-of-the-art inverse problems theory, focusing on numerically relevant aspects and omitting subordinate

generalizations;presents diverse real-world applications, important test cases, and possible pitfalls; and treats these applications with the same rigor and depth as the theory.

Set-valued Optimization Akhtar A. Khan 2014-10-20 Set-valued optimization is a vibrant and expanding branch of mathematics that deals with optimization problems where the objective map and/or the constraints maps are set-valued maps acting between certain spaces. Since set-valued maps subsumes single valued maps, set-valued optimization provides an important extension and unification of the scalar as well as the vector optimization problems. Therefore this relatively new discipline has justifiably attracted a great deal of attention in recent years. This book presents, in a unified framework, basic properties on ordering relations, solution concepts for set-valued optimization problems, a detailed description of convex set-valued maps, most recent developments in separation theorems, scalarization techniques, variational principles, tangent cones of first and higher order, sub-differential of set-valued maps, generalized derivatives of set-valued maps, sensitivity analysis, optimality conditions, duality and applications in economics among other things.

Understanding and Implementing the Finite Element Method - Mark S. Gockenbach 2006-01-01 Understanding and Implementing the Finite Element Method Mark S. Gockenbach "Upon completion of this book a student or researcher would be well prepared to employ finite elements for an application problem or proceed to the cutting edge of research in finite element methods. The accuracy and the thoroughness of the book are excellent." -- Anthony Kearsley, research mathematician, National Institute of Standards and Technology The infinite element method is the most

powerful general-purpose technique for computing accurate solutions to partial differential equations. Understanding and Implementing the Finite Element Method is essential reading for those interested in understanding both the theory and the implementation of the finite element method for equilibrium problems. This book contains a thorough derivation of the finite element equations as well as sections on programming the necessary calculations, solving the finite element equations, and using a posteriori error estimates to produce validated solutions. Accessible introductions to advanced topics, such as multigrid solvers, the hierarchical basis conjugate gradient method, and adaptive mesh generation, are provided. Each chapter ends with exercises to help readers master these topics.

Introduction to Integrative Engineering - Guigen Zhang 2017-03-03

This textbook is designed for an introductory course at undergraduate and graduate levels for bioengineering students. It provides a systematic way of examining bioengineering problems in a multidisciplinary computational approach. The book introduces basic concepts of multidiscipline-based computational modeling methods, provides detailed step-by-step techniques to build a model with consideration of underlying multiphysics, and discusses many important aspects of a modeling approach including results interpretation, validation, and assessment.

Fundamentals of event-continuous system simulation theory - Yury Shornikov 2022-01-29

Effective computer analysis of event-continuous and hybrid systems is addressed. A multipurpose software architecture employing control of the integration step size with regard to the error, stability, and unilateral events is proposed. The problem of synchronization of continuous and discrete processes is dealt

with. All new theoretical concepts are tested on heterogeneous applications to biological systems, large electric power systems, mechanical engineering and chemical kinetics problems.

Applied Partial Differential Equations - Richard Haberman 2013

Normal 0 false false false This book emphasizes the physical interpretation of mathematical solutions and introduces applied mathematics while presenting differential equations. Coverage includes Fourier series, orthogonal functions, boundary value problems, Green's functions, and transform methods. This text is ideal for readers interested in science, engineering, and applied mathematics.

Advanced Linear Algebra - Nicholas Loehr 2014-04-10

Designed for advanced undergraduate and beginning graduate students in linear or abstract algebra, Advanced Linear Algebra covers theoretical aspects of the subject, along with examples, computations, and proofs. It explores a variety of advanced topics in linear algebra that highlight the rich interconnections of the subject to geometry, algebra, analysis, combinatorics, numerical computation, and many other areas of mathematics. The book's 20 chapters are grouped into six main areas: algebraic structures, matrices, structured matrices, geometric aspects of linear algebra, modules, and multilinear algebra. The level of abstraction gradually increases as students proceed through the text, moving from matrices to vector spaces to modules. Each chapter consists of a mathematical vignette devoted to the development of one specific topic. Some chapters look at introductory material from a sophisticated or abstract viewpoint while others provide elementary expositions of more theoretical concepts. Several chapters offer unusual perspectives or novel treatments of standard results. Unlike similar advanced mathematical texts, this one

minimizes the dependence of each chapter on material found in previous chapters so that students may immediately turn to the relevant chapter without first wading through pages of earlier material to access the necessary algebraic background and theorems. Chapter summaries contain a structured list of the principal definitions and results. End-of-chapter exercises aid students in digesting the material. Students are encouraged to use a computer algebra system to help solve computationally intensive exercises.

Automated Solution of Differential Equations by the Finite Element Method - Anders Logg 2012-02-24

This book is a tutorial written by researchers and developers behind the FEniCS Project and explores an advanced, expressive approach to the development of mathematical software. The presentation spans mathematical background, software design and the use of FEniCS in applications. Theoretical aspects are complemented with computer code which is available as free/open source software. The book begins with a special introductory tutorial for beginners. Following are chapters in Part I addressing fundamental aspects of the approach to automating the creation of finite element solvers. Chapters in Part II address the design and implementation of the FEnicS software. Chapters in Part III present the application of FEniCS to a wide range of applications, including fluid flow, solid mechanics, electromagnetics and geophysics.

A Panorama of Mathematics: Pure and Applied - Carlos M. da Fonseca 2016-02-26

This volume contains the proceedings of the Conference on Mathematics and its Applications-2014, held from November 14-17, 2014, at Kuwait University, Safat, Kuwait. Papers contained in this volume cover various topics in pure and applied mathematics ranging from an introductory study of quotients

and homomorphisms of C-systems, also known as contextual pre-categories, to the most important consequences of the so-called Fokas method. Also covered are multidisciplinary topics such as new structural and spectral matricial results, acousto-electromagnetic tomography method, a recent hybrid imaging technique, some numerical aspects of sonic-boom minimization, PDE eigenvalue problems, von Neumann entropy in graph theory, the relative entropy method for hyperbolic systems, conductances on grids, inverse problems in magnetohydrodynamics, location and size estimation of small rigid bodies using elastic far-fields, and the space-time fractional Schrödinger equation, just to cite a few. Papers contained in this volume cover various topics in pure and applied mathematics ranging from an introductory study of quotients and homomorphisms of C-systems, also known as contextual pre-categories, to the most important consequences of the so-called Fokas method. Also covered are multidisciplinary topics such as new structural and spectral matricial results, acousto-electromagnetic tomography method, a recent hybrid imaging technique, some numerical aspects of sonic-boom minimization, PDE eigenvalue problems, von Neumann entropy in graph theory, the relative entropy method for hyperbolic systems, conductances on grids, inverse problems in magnetohydrodynamics, location and size estimation of small rigid bodies using elastic far-fields, and the space-time fractional Schrödinger equation, just to cite a few. - See more at: http://s350148651-preview.tizrapublisher.com/conm-658/#sthash.74nRhV3y.dpufThis volume contains the proceedings of the Conference on Mathematics and its Applications–2014, held from November 14–17, 2014, at Kuwait University, Safat, Kuwait. - See more at: http://s350148651-preview.tizrapublisher.com/conm-658/#sth

ash.74nRhV3y.dpuf
Applications of Nonlinear Analysis - Themistocles M. Rassias 2018-06-29
New applications, research, and fundamental theories in nonlinear analysis are presented in this book. Each chapter provides a unique insight into a large domain of research focusing on functional equations, stability theory, approximation theory, inequalities, nonlinear functional analysis, and calculus of variations with applications to optimization theory. Topics include: Fixed point theory Fixed-circle theory Coupled fixed points Nonlinear duality in Banach spaces Jensen's integral inequality and applications Nonlinear differential equations Nonlinear integro-differential equations Quasiconvexity, Stability of a Cauchy-Jensen additive mapping Generalizations of metric spaces Hilbert-type integral inequality, Solitons Quadratic functional equations in fuzzy Banach spaces Asymptotic orbits in Hill'sproblem Time-domain electromagnetics Inertial Mann algorithms Mathematical modelling Robotics Graduate students and researchers will find this book helpful in comprehending current applications and developments in mathematical analysis. Research scientists and engineers studying essential modern methods and techniques to solve a variety of problems will find this book a valuable source filled with examples that illustrate concepts.

Numerical Analysis with Applications in Mechanics and Engineering - Petre Teodorescu 2013-06-04
NUMERICAL ANALYSIS WITH APPLICATIONS IN MECHANICS AND ENGINEERING A much-needed guide on how to use numerical methods to solve practical engineering problems Bridging the gap between mathematics and engineering, Numerical Analysis with Applications in Mechanics and Engineering arms readers with powerful tools for solving real-world problems in mechanics,

physics, and civil and mechanical engineering. Unlike most books on numerical analysis, this outstanding work links theory and application, explains the mathematics in simple engineering terms, and clearly demonstrates how to use numerical methods to obtain solutions and interpret results. Each chapter is devoted to a unique analytical methodology, including a detailed theoretical presentation and emphasis on practical computation. Ample numerical examples and applications round out the discussion, illustrating how to work out specific problems of mechanics, physics, or engineering. Readers will learn the core purpose of each technique, develop hands-on problem-solving skills, and get a complete picture of the studied phenomenon. Coverage includes: How to deal with errors in numerical analysis Approaches for solving problems in linear and nonlinear systems Methods of interpolation and approximation of functions Formulas and calculations for numerical differentiation and integration Integration of ordinary and partial differential equations Optimization methods and solutions for programming problems Numerical Analysis with Applications in Mechanics and Engineering is a one-of-a-kind guide for engineers using mathematical models and methods, as well as for physicists and mathematicians interested in engineering problems.

*Introduction to Analysis of the Infinit-e*Leonhard Euler 2012-12-06

From the preface of the author: "...I have divided this work into two books; in the first of these I have confined myself to those matters concerning pure analysis. In the second book I have explained those thing which must be known from geometry, since analysis is ordinarily developed in such a way that its application to geometry is shown. In the first book, since all of analysis is concerned with variable quantities and functions of

such variables, I have given full treatment to functions. I have also treated the transformation of functions and functions as the sum of infinite series. In addition I have developed functions in infinite series..."

Numerical Algebra, Matrix Theory, Differential-Algebraic Equations and Control Theory - Peter Benner 2015-05-09

This edited volume highlights the scientific contributions of Volker Mehrmann, a leading expert in the area of numerical (linear) algebra, matrix theory, differential-algebraic equations and control theory. These mathematical research areas are strongly related and often occur in the same real-world applications. The main areas where such applications emerge are computational engineering and sciences, but increasingly also social sciences and economics. This book also reflects some of Volker Mehrmann's major career stages. Starting out working in the areas of numerical linear algebra (his first full professorship at TU Chemnitz was in "Numerical Algebra," hence the title of the book) and matrix theory, Volker Mehrmann has made significant contributions to these areas ever since. The highlights of these are discussed in Parts I and II of the present book. Often the development of new algorithms in numerical linear algebra is motivated by problems in system and control theory. These and his later major work on differential-algebraic equations, to which he together with Peter Kunkel made many groundbreaking contributions, are the topic of the chapters in Part III. Besides providing a scientific discussion of Volker Mehrmann's work and its impact on the development of several areas of applied mathematics, the individual chapters stand on their own as reference works for selected topics in the fields of numerical (linear) algebra, matrix theory, differential-algebraic equations and control theory.

Partial Differential Equations Walter A. Strauss 2007-12-21

Partial Differential Equations

presents a balanced and comprehensive introduction to the concepts and techniques required to solve problems containing unknown functions of multiple variables. While focusing on the three most classical partial differential equations (PDEs)—the wave, heat, and Laplace equations—this detailed text also presents a broad practical perspective that merges mathematical concepts with real-world application in diverse areas including molecular structure, photon and electron interactions, radiation of electromagnetic waves, vibrations of a solid, and many more. Rigorous pedagogical tools aid in student comprehension; advanced topics are introduced frequently, with minimal technical jargon, and a wealth of exercises reinforce vital skills and invite additional self-study. Topics are presented in a logical progression, with major concepts such as wave propagation, heat and diffusion, electrostatics, and quantum mechanics placed in contexts familiar to students of various fields in science and engineering. By understanding the properties and applications of PDEs, students will be equipped to better analyze and interpret central processes of the natural world.