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Approximate Solutions of Common Fixed-Point Problems
Approximate Solutions of Operator Equations

HALLIE JADON

Numerical Approximation Methods Approximate Solutions of a Non-linear Differential Equation Using Laplace-transform and Reversion-of-series TechniquesThe reversion-of-series method is extended to the s - domain by using non-linear Laplace transforms. The reversion of series in the s - domain is applied to a non-linear differential equation and approximate solutions are obtained. The approximate solution is modified for the case where the steady state is a constant value by calculating the exact steady-state value and applying it to the reversion approximation. The non-linear differential equation considered is Duffing's equation with a damping term and sinusoidal and constant forcing functions. The theoretical solutions

are compared to machine solutions. (Author).Approximate Solution of Non-Symmetric Generalized Eigenvalue Problems and Linear Matrix Equations on HPC Platforms
Any student wishing to solve problems via mathematical modelling will find that this book provides an excellent introduction to the subject.
Approximate Solution on the Non-stationary Pitching of Ships in Regular Waves Springer
Approximate Solutions of a Non-linear Differential Equation Using Laplace-transform and Reversion-of-series Techniques
Superconvergence in the Generalized Finite Element Method Springer
The reversion-of-series method is extended to the s - domain by using non-linear Laplace transforms. The reversion of series in the s - domain is applied to a non-linear differential equation and approximate solutions are obtained. The approximate solution is modified for the case where the steady state is a constant value by calculating the exact steady-state value and applying it to the reversion approximation. The non-linear differential equation considered is Duffing's equation with a damping term and sinusoidal and constant forcing functions. The theoretical solutions are compared to machine solutions. (Author).
A Non-equilibrium

Statistical Mechanics Cambridge University Press This book constitutes the thoroughly refereed post-proceedings of the 9th International Workshop on Approximation and Online Algorithms, WAOA 2011, held in Saarbrücken, Germany, in September 2011. The 21 papers presented were carefully reviewed and selected from 48 submissions. The volume also contains an extended abstract of the invited talk of Prof. Klaus Jansen. The Workshop on Approximation and Online Algorithms focuses on the design and analysis of algorithms for online and computationally hard problems. Both kinds of problems have a large number of applications in a wide variety of fields. Topics of interest for WAOA 2011 were: algorithmic game theory, approximation classes, coloring and partitioning, competitive analysis, computational finance, cuts and connectivity, geometric problems, inapproximability results, mechanism design, network design, packing and covering, paradigms for design and analysis of approximation and online algorithms, parameterized complexity, randomization techniques and scheduling problems. *Encyclopaedia of Mathematics* Springer Delineating a comprehensive theory, Advanced Vibration Analysis provides the bedrock for building a

general mathematical framework for the analysis of a model of a physical system undergoing vibration. The book illustrates how the physics of a problem is used to develop a more specific framework for the analysis of that problem. The author elucidat

The Duffing Equation

CRC Press

The Eighth International Conference on Hyperbolic Problems - Theory, Nu merics, Applications, was held in Magdeburg, Germany, from February 27 to March 3, 2000. It was attended by over 220 participants from many European countries as well as Brazil, Canada, China, Georgia, India, Israel, Japan, Taiwan, und the USA. There were 12 plenary lectures, 22 further invited talks, and around 150 con tributed talks in parallel sessions as well as posters. The speakers in the parallel sessions were invited to provide a poster in order to enhance the dissemination of information. Hyperbolic partial differential equations describe phenomena of material or wave transport in physics, biology and engineering, especially in the field of fluid mechanics. Despite considerable progress, the mathematical theory is still strug gling with fundamental open problems concerning systems of such equations in multiple space dimensions. For various applications the development of

accurate and efficient numerical schemes for computation is of fundamental importance. Applications touched in these proceedings concern one-phase and multiphase fluid flow, phase transitions, shallow water dynamics, elasticity, extended ther modynamics, electromagnetism, classical and relativistic magnetohydrodynamic s, cosmology. Contributions to the abstract theory of hyperbolic systems deal with viscous and relaxation approximations, front tracking and wellposedness, stability ofshock profiles and multi-shock patterns, traveling fronts for transport equations. Numerically oriented articles study finite difference, finite volume, and finite ele ment schemes, adaptive, multiresolution, and artificial dissipation methods.

Scientific and Technical Aerospace Reports Springer

One of the most important chapters in modern functional analysis is the theory of approximate methods for solution of various mathematical problems. Besides providing considerably simplified approaches to numerical methods, the ideas of functional analysis have also given rise to essentially new computation schemes in problems of linear algebra, differential and integral equations, nonlinear analysis, and so on.

The general theory of approximate methods includes many known fundamental results. We refer to the classical work of Kantorovich; the investigations of projection methods by Bogolyubov, Krylov, Keldysh and Petrov, much furthered by Mikhlin and Pol'skii; Tikho nov's methods for approximate solution of ill-posed problems; the general theory of difference schemes; and so on. During the past decade, the Voronezh seminar on functional analysis has systematically discussed various questions related to numerical methods; several advanced courses have been held at Voronezh Uni versity on the application of functional analysis to numerical mathe matics. Some of this research is summarized in the present monograph. The authors' aim has not been to give an exhaustive account, even of the principal known results. The book consists of five chapters.

Approximate Solutions of a Non-linear Differential Equation Using Laplace-transform and Reversion-of-series Techniques

Springer Nature

This book presents results on the convergence behavior of algorithms which are known as vital tools for solving convex feasibility problems and common fixed point problems. The main goal for us in dealing with a known

computational error is to find what approximate solution can be obtained and how many iterates one needs to find it. According to know results, these algorithms should converge to a solution. In this exposition, these algorithms are studied, taking into account computational errors which remain consistent in practice. In this case the convergence to a solution does not take place. We show that our algorithms generate a good approximate solution if computational errors are bounded from above by a small positive constant. Beginning with an introduction, this monograph moves on to study: · dynamic string-averaging methods for common fixed point problems in a Hilbert space · dynamic string methods for common fixed point problems in a metric space“/p> · dynamic string-averaging version of the proximal algorithm · common fixed point problems in metric spaces · common fixed point problems in the spaces with distances of the Bregman type · a proximal algorithm for finding a common zero of a family of maximal monotone operators · subgradient projections algorithms for convex feasibility problems in Hilbert spaces

Advanced Numerical Approximation of Nonlinear Hyperbolic Equations John Wiley & Sons

A one-stop Desk Reference, for

engineers involved in all aspects of aerospace; this is a book that will not gather dust on the shelf. It brings together the essential professional reference content from leading international contributors in the field. Material covers a broad topic range from Structural Components of Aircraft, Design and Airworthiness to Aerodynamics and Modelling * A fully searchable Mega Reference Ebook, providing all the essential material needed by Aerospace Engineers on a day-to-day basis. * Fundamentals, key techniques, engineering best practice and rules-of-thumb together in one quick-reference. * Over 2,500 pages of reference material, including over 1,500 pages not included in the print edition

Formal Methods in Computer-Aided Design World Scientific

An introductory textbook covering the fundamentals of linear finite element analysis (FEA) This book constitutes the first volume in a two-volume set that introduces readers to the theoretical foundations and the implementation of the finite element method (FEM). The first volume focuses on the use of the method for linear problems. A general procedure is presented for the finite element analysis (FEA) of a physical problem, where the goal is to specify the values of a field function. First, the

strong form of the problem (governing differential equations and boundary conditions) is formulated. Subsequently, a weak form of the governing equations is established. Finally, a finite element approximation is introduced, transforming the weak form into a system of equations where the only unknowns are nodal values of the field function. The procedure is applied to one-dimensional elasticity and heat conduction, multi-dimensional steady-state scalar field problems (heat conduction, chemical diffusion, flow in porous media), multi-dimensional elasticity and structural mechanics (beams/shells), as well as time-dependent (dynamic) scalar field problems, elastodynamics and structural dynamics. Important concepts for finite element computations, such as isoparametric elements for multi-dimensional analysis and Gaussian quadrature for numerical evaluation of integrals, are presented and explained. Practical aspects of FEA and advanced topics, such as reduced integration procedures, mixed finite elements and verification and validation of the FEM are also discussed. Provides detailed derivations of finite element equations for a variety of problems. Incorporates quantitative examples on one-dimensional

and multi-dimensional FEA. Provides an overview of multi-dimensional linear elasticity (definition of stress and strain tensors, coordinate transformation rules, stress-strain relation and material symmetry) before presenting the pertinent FEA procedures. Discusses practical and advanced aspects of FEA, such as treatment of constraints, locking, reduced integration, hourglass control, and multi-field (mixed) formulations. Includes chapters on transient (step-by-step) solution schemes for time-dependent scalar field problems and elastodynamics/structural dynamics. Contains a chapter dedicated to verification and validation for the FEM and another chapter dedicated to solution of linear systems of equations and to introductory notions of parallel computing. Includes appendices with a review of matrix algebra and overview of matrix analysis of discrete systems. Accompanied by a website hosting an open-source finite element program for linear elasticity and heat conduction, together with a user tutorial. Fundamentals of Finite Element Analysis: Linear Finite Element Analysis is an ideal text for undergraduate and graduate students in civil, aerospace and mechanical engineering, finite element software vendors, as well as practicing engineers and anybody with an

interest in linear finite element analysis.

Introduction to Approximate Solution Techniques, Numerical Modeling, and Finite Element Methods

Springer

In this book, a new approach to approximation procedures is developed. This new approach is characterized by the common feature that the procedures are accurate without being convergent as the mesh size tends to zero. This lack of convergence is compensated for by the flexibility in the choice of approximating functions, the simplicity of multi-dimensional generalizations, and the possibility of obtaining explicit formulas for the values of various integral and pseudodifferential operators applied to approximating functions. The developed techniques allow the authors to design new classes of high-order quadrature formulas for integral and pseudodifferential operators, to introduce the concept of approximate wavelets, and to develop new efficient numerical and semi-numerical methods for solving boundary value problems of mathematical physics. The book is intended for researchers interested in approximation theory and numerical methods for partial differential and integral equations.

Approximate Analytic Methods for the Solution of a

Class of Strongly Non-linear Differential Equations Springer Science & Business Media
This book presents emerging concepts in data mining, big data analysis, communication, and networking technologies, and discusses the state-of-the-art in data engineering practices to tackle massive data distributions in smart networked environments. It also provides insights into potential data distribution challenges in ubiquitous data-driven networks, highlighting research on the theoretical and systematic framework for analyzing, testing and designing intelligent data analysis models for evolving communication frameworks. Further, the book showcases the latest developments in wireless sensor networks, cloud computing, mobile network, autonomous systems, cryptography, automation, and other communication and networking technologies. In addition, it addresses data security, privacy and trust, wireless networks, data classification, data prediction, performance analysis, data validation and verification models, machine learning, sentiment analysis, and various data analysis techniques.
Complexity and Approximation American Mathematical Soc.

The solution of the generalized eigenvalue problem is one of the computationally most challenging operations in the field of numerical linear algebra. A well known algorithm for this purpose is the QZ algorithm. Although it has been improved for decades and is available in many software packages by now, its performance is unsatisfying for medium and large scale problems on current computer architectures. In this thesis, a replacement for the QZ algorithm is developed. The design of the new spectral divide and conquer algorithms is oriented towards the capabilities of current computer architectures, including the support for accelerator devices. The thesis describes the co-design of the underlying mathematical ideas and the hardware aspects. Closely connected with the generalized eigenvalue value problem, the solution of Sylvester-like matrix equations is the concern of the second part of this work. Following the co-design approach, introduced in the first part of this thesis, a flexible framework covering (generalized) Sylvester, Lyapunov, and Stein equations is developed. The combination of the new algorithms for the generalized eigenvalue problem and the Sylvester-like equation solves problems within an hour, whose solution took several days incorporating the

QZ and the Bartels-Stewart algorithm.

Homotopy Analysis Method in Nonlinear Differential Equations
Springer
This book presents exact, closed-form solutions for the response of a variety of nonlinear oscillators (free, damped, forced). The solutions presented are expressed in terms of special functions. To help the reader understand these `non-standard' functions, detailed explanations and rich illustrations of their meanings and contents are provided. In addition, it is shown that these exact solutions in certain cases comprise the well-known approximate solutions for some nonlinear oscillations.

Nonlinear Ordinary Differential Equations
BoD – Books on Demand
This work presents the construction of an asymptotic technique for solving the Liouville equation, which is an analogue of the Enskog-Chapman technique for the Boltzmann equation. Because the assumption of molecular chaos has not been introduced, the macroscopic variables defined by the arithmetic means of the corresponding microscopic variables are random in general. Therefore, it is convenient for describing the turbulence phenomena. The asymptotic technique for the Liouville equation reveals a term showing the interaction between

the temperature and the velocity of the fluid flows, which will be lost under the assumption of molecular chaos. Technical Translations John Wiley & Sons This book offers an elementary and self-contained introduction to many fundamental issues concerning approximate solutions of operator equations formulated in an abstract Banach space setting, including important topics such as solvability, computational schemes, convergence, stability and error estimates. The operator equations under investigation include various linear and nonlinear types of ordinary and partial differential equations, integral equations, and abstract evolution equations, which are frequently involved in applied mathematics and engineering applications.Each chapter contains well-selected examples and exercises, for the purposes of demonstrating the fundamental theories and methods developed in the text and familiarizing the reader with functional analysis techniques useful for numerical solutions of various operator equations. The Elements of Continuum Biomechanics Logos Verlag Berlin GmbH This book documents the state of the art in combinatorial optimization, presenting approximate solutions of virtually all relevant classes of NP-hard optimization problems. The wealth of

problems, algorithms, results, and techniques make it an indispensible source of reference for professionals. The text smoothly integrates numerous illustrations, examples, and exercises.

Stochastic Control Springer Nature

This book is a collection of lecture notes for the LIASFMA Shanghai Summer School on 'One-dimensional Hyperbolic Conservation Laws and Their Applications' which was held during August 16 to August 27, 2015 at Shanghai Jiao Tong University, Shanghai, China. This summer school is one of the activities promoted by Sino-French International Associate Laboratory in Applied Mathematics (LIASFMA in short). LIASFMA was established jointly by eight institutions in China and France in 2014, which is aimed at providing a platform for some of the leading French and Chinese mathematicians to conduct in-depth researches, extensive exchanges, and student training in the field of applied mathematics. This summer school has the privilege of being the first summer school of the newly established LIASFMA, which makes it significant.

Hyperbolic Problems: Theory, Numerics, Applications World Scientific Publishing Company

An appealing and engaging introduction to Continuum Mechanics in Biosciences This book

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

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

One-dimensional Hyperbolic Conservation Laws And Their Applications

Springer Science & Business Media

In this paper, we address the problem of the existence of superconvergence points of approximate solutions, obtained from the Generalized Finite Element Method (GFEM), of a Neumann elliptic boundary value problem. GFEM is a Galerkin method that uses non-polynomial shape functions. In particular, we show that the superconvergence points for the gradient of the approximate are zeros of certain systems of non-linear equations that do not depend on the solution of the boundary value problem. For approximate solutions with second derivatives, we have also characterized the superconvergence points of the second derivatives of the approximate solution as the roots of certain systems of non-linear equations. We note

that it is easy to construct smooth generalized finite element approximation.

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