A Semi Analytical Method For Var And Credit Exposure Analysis

DAVIES ALIJAH

Advanced Numerical and Semi-Analytical Methods for Differential Equations Springer Nature
This book provides a comprehensive introduction to the analysis of functionally graded materials and structures. Functionally graded materials (FGMs), in which the volume fractions of two or more constituent materials are designed to vary continuously as a function of position along certain direction(s), have been developed and studied over the past three decades. The major advantage of FGMs is that no distinct internal boundaries exist, and failures from interfacial stress concentrations developed in conventional components can be avoided. The gradual change of material properties can be tailored to different applications and working environments. As these materials' range of application expands, new methodologies have to be developed to characterize them, and to design and analyze structural components made of them. Despite a number of existing papers on the analysis of functionally graded materials and structures, there is no single book that is devoted entirely to the analysis of functionally graded beams, plates and shells using different methods, e.g.,analytical or semi-analytical methods. Filling this gap in the literature, the book offers a valuable reference resource for senior undergraduates, graduate students, researchers, and engineers in this field. The results presented here can be used as a benchmark for checking the validity and accuracy of other numerical solutions. They can also be used directly in the design of functionally graded materials and structures.

A Dissertation... Springer
Solving nonlinear problems is inherently difficult, and the stronger the nonlinearity, the more intractable solutions become. Analytic approximations often break down as nonlinearity becomes strong, and even perturbation approximations are valid only for problems with weak nonlinearity. This book introduces a powerful new analytic method for

A Semi-analytical Method of Factorial Rotation to Simple Structure Advanced Numerical and Semi-Analytical Methods for Differential Equations
A semi-analytical method for determining the strain energy release rate due to a prescribed interface crack in an adhesively-bonded, single-lap composite joint subjected to axial tension is presented. The field equations in terms of displacements within the joint are formulated by using first-order shear deformable, laminated plate theory together with kinematic relations and force equilibrium conditions. The stress distributions for the adherends and adhesive are determined after the appropriate boundary and loading conditions are applied and the equations for the field displacements are solved. Based on the adhesive stress distributions, the forces at the crack tip are obtained and the strain energy release rate of the crack is determined by using the virtual crack closure technique (VCCT). Additionally, the test specimen geometry from both the ASTM D3165 and D1002 test standards are utilized during the derivation of the field equations in order to correlate analytical models with future test results. The system of second-order differential field equations is solved to provide the adherend and adhesive stress response using the symbolic computation tool, Maple 9. Finite element analyses using J-integral as well as VCCT were performed to verify the developed analytical model. The finite element analyses were conducted using the commercial finite element analysis software ABAQUS. The results determined using the analytical method correlated well with the results from the finite element analyses.

A Semi-analytical Method for Steady-state Solution in HVDC Analysis Springer Science & Business Media
Advanced Numerical and Semi-Analytical Methods for Differential EquationsJohn Wiley & Sons

A Semi-Analytical Method for Determining the Energy Release Rate of Cracks in Adhesively-Bonded Single-Lap Composite Joints Elsevier
This book emphasizes in detail the applicability of the Optimal Homotopy Asymptotic Method to various engineering problems. It is a continuation of the book "Nonlinear Dynamical Systems in Engineering: Some Approximate Approaches", published at Springer in 2011 and it contains a great amount of practical models from various fields of engineering such as classical and fluid mechanics, thermodynamics, nonlinear oscillations, electrical machines and so on. The main structure of the book consists of 5 chapters. The first chapter is introductory while the second chapter is devoted to a short history of the development of homotopy methods, including the basic ideas of the Optimal Homotopy Asymptotic Method. The last three chapters, from Chapter 3 to Chapter 5, are introducing three distinct alternatives of the Optimal Homotopy Asymptotic Method with illustrative applications to nonlinear dynamical systems. The third chapter deals with the first alternative of our approach with two iterations. Five applications are presented from fluid mechanics and nonlinear oscillations. The Chapter 4 presents the Optimal Homotopy Asymptotic Method with a single iteration and solving the linear equation on the first approximation. Here are treated 32 models from different fields of engineering such as fluid mechanics, thermodynamics, nonlinear damped and undamped oscillations, electrical machines and even from physics and biology. The last chapter is devoted to the Optimal Homotopy Asymptotic Method with a single iteration but without solving the equation in the first approximation.

A Semi-analytical Method for the Thermal-hydraulics of a Boiling Water Reactor Springer Science & Business Media
Groundwater-surface water interaction is a key component of the hydrologic cycle. This interaction plays a key role in many environmental issues such as the impacts of land use and climate change on water availability and water quality. Modeling of local and regional groundwater-surface water interactions improves understanding of these environmental issues and assists in addressing them. Because of the physical and mathematical complexities of this interaction, numerical approaches are generally used to model water exchange between subsurface and surface domains. The efficiency, accuracy, and stability of mesh-based numerical models, however, depend upon the resolution of the underlying grid or mesh. Grid-free analytical methods can provide fast, accurate, continuous and differentiable solutions to groundwater-surface water interaction problems. These solutions exactly satisfy mass balance in the entire internal domain and may improve our understanding of groundwater-surface water interaction principles. However, to model this interaction, analytical approaches typically required simplifying, sometimes unrealistic, assumptions. They are typically used to implement linearized mathematical models in homogenous confined or semi-confined aquifers with geometrically regular domains. By benefiting from the strengths of both analytical and numerical approaches, grid-free semi-analytical methods may be able to address more challenging groundwater problems which have been out of reach of traditional analytical approaches, and/or are poorly simulated using mesh-based numerical methods. Here, novel 2-D and 3-D semi-analytical solutions for the simulation of mathematically and physically complex groundwater-surface water interaction problems are developed, assessed and applied. Those models are based upon the series solution method and analytic element method (AEM) and are intended to address groundwater-surface water interactions induced by pumping wells and/or the presence of surface water bodies in naturally complex stratified unconfined aquifers. Semi-analytical solutions are obtained using the least squares method, which is used to determine the unknown coefficients in the series expansion and the unknown strengths of analytic elements. The series and AEM solutions automatically satisfy the groundwater governing equation. Hence, the resulting solutions are exact over the entire domain except along boundaries and layer interfaces where boundary and continuity conditions are met with high precision. A robust iterative algorithm is used to implement a free boundary condition along the phreatic surface with a priori unknown location. This thesis addresses three general problem types never

addressed within a semi-analytic framework. First, a steady-state free boundary semi-analytical series solutions model is developed to simulate 2-D saturated-unsaturated flow in geometrically complex stratified unconfined aquifers. The saturated-unsaturated flow is controlled by water exchange along the land surface (e.g., evapotranspiration and infiltration) and the presence of surface water bodies. The water table and capillary fringe are allowed to intersect stratigraphic interfaces. The capillary fringe zone, unsaturated zone, groundwater zone and their interactions are incorporated with a high degree of accuracy. This model is used to assess the influences of important factors on unsaturated flow behavior and the water table elevation. Second, a 3-D free boundary semi-analytical series solution model is developed to simulate groundwater-surface water interaction controlled by infiltration, seepage faces and surface water bodies along the land surface. This model can simulate the water exchange between groundwater and surface water in geometrically complex stratified phreatic (unconfined) aquifers. The a priori unknown phreatic surface will be obtained iteratively while the locations of seepage faces don't have to be known a priori (i.e., this is a constrained free boundary problem).

The Optimal Homotopy Asymptotic Method CRC Press

ABSTRACT: Considering the large amounts of data that is collected everyday in various domains such as health care, financial services, astrophysics and many others, there is a pressing need to convert this information into knowledge. Machine learning and data mining are both concerned with achieving this goal in a scalable fashion. The main theme of my work has been to analyze and better understand prevalent classification techniques and paradigms which are an integral part of machine learning and data mining research, with an aim to reduce the hiatus between theory and practice.

A Semi-analytical Method for the Temporal Prediction of Chlorophyll in Clear Lake, Iowa Using Hyperion Imagery Wiley

Application of Semi-Analytical Methods for Nanofluid Flow and Heat Transfer applies semi-analytical methods to solve a range of engineering problems. After various methods are introduced, their application in nanofluid flow and heat transfer, magnetohydrodynamic flow, electrohydrodynamic flow and heat transfer, and nanofluid flow in porous media within several examples are explored. This is a valuable reference resource for materials scientists and engineers that will help familiarize them with a wide range of semi-analytical methods and how they are used in nanofluid flow and heat transfer. The book also includes case studies to illustrate how these methods are used in practice. Presents detailed information, giving readers a complete familiarity with governing equations where nanofluid is used as working fluid Provides the fundamentals of new analytical methods, applying them to applications of nanofluid flow and heat transfer in the presence of magnetic and electric field Gives a detailed overview of nanofluid motion in porous media

1990-2007 World Scientific

The Adomian decomposition method enables the accurate and efficient analytic solution of nonlinear ordinary or partial differential equations without the need to resort to linearization or perturbation approaches. It unifies the treatment of linear and nonlinear, ordinary or partial differential equations, or systems of such equations, into a single basic method, which is applicable to both initial and boundary-value problems. This volume deals with the application of this method to many problems of physics, including some frontier problems which have previously required much more computationally-intensive approaches. The opening chapters deal with various fundamental aspects of the decomposition method. Subsequent chapters deal with the application of the method to nonlinear oscillatory systems in physics, the Duffing equation, boundary-value problems with closed irregular contours or surfaces, and other frontier areas. The potential application of this method to a wide range of problems in diverse disciplines such as biology, hydrology, semiconductor physics, wave propagation, etc., is highlighted. For researchers and graduate students of physics, applied mathematics and engineering, whose work involves mathematical modelling and the quantitative solution of systems of equations.

Numerical Analysis of Vibrations of Structures under Moving Inertial Load CRC Press

Examines numerical and semi-analytical methods for differential equations that can be used for solving practical ODEs and PDEs This student-friendly book deals with various approaches for solving differential equations numerically or semi-analytically depending on the type of equations and offers simple example problems to help readers along. Featuring both traditional and recent methods, Advanced Numerical and Semi Analytical Methods for Differential Equations begins with a review of basic numerical methods. It then looks at Laplace, Fourier, and weighted residual methods for solving differential equations. A new challenging method of Boundary Characteristics Orthogonal Polynomials (BCOPs) is introduced next. The book then discusses Finite Difference Method (FDM), Finite Element Method (FEM), Finite Volume Method (FVM), and Boundary Element Method (BEM). Following that, analytical/semi analytic methods like Akbari Ganji's Method (AGM) and Exp-function are used to solve nonlinear differential equations. Nonlinear differential equations using semi-analytical methods are also addressed, namely Adomian Decomposition Method (ADM), Homotopy Perturbation Method (HPM), Variational Iteration Method (VIM), and Homotopy Analysis Method (HAM). Other topics covered include: emerging areas of research related to the solution of differential equations based on differential quadrature and wavelet approach; combined and hybrid methods for solving differential equations; as well as an overview of fractal differential equations. Further, uncertainty in term of intervals and fuzzy numbers have also been included, along with the interval finite element method. This book: Discusses various methods for solving linear and nonlinear ODEs and PDEs Covers basic numerical techniques for solving differential equations along with various discretization methods Investigates nonlinear differential equations using semi-analytical methods Examines differential equations in an uncertain environment Includes a new scenario in which uncertainty (in term of intervals and fuzzy numbers) has been included in differential equations Contains solved example problems, as well as some unsolved problems for self-validation of the topics covered Advanced Numerical and Semi Analytical Methods for Differential Equations is an excellent text for graduate as well as post graduate students and researchers studying various methods for solving differential equations, numerically and semi-analytically.

A Semi-numerical Semi-analytical Method for the Two-group Theory of Xenon Oscillation Calculations for Nuclear Reactors Xlibris Corporation

An analytical approximation is developed for purely conductive heat transfer from impermeable blocks of rock to fluids sweeping past the rocks in fractures. The method was incorporated into a multi-phase fluid and heat flow simulator. Comparison with exact analytical solutions and with simulations using a multiple interacting continua approach shows very good accuracy, with no increase in computing time compared to porous medium simulations.

Buckling and Postbuckling Structures II BoD – Books on Demand

Moving inertial loads are applied to structures in civil engineering, robotics, and mechanical engineering. Some fundamental books exist, as well as thousands of research papers. Well known is the book by L. Frýba, Vibrations of Solids and Structures Under Moving Loads, which describes almost all problems concerning non-inertial loads. This book presents broad description of numerical tools successfully applied to structural dynamic analysis. Physically we deal with non-conservative systems. The discrete approach formulated with the use of the classical finite element method results in elemental matrices, which can be directly added to global structure matrices. A more general approach is carried out with the space-time finite element method. In such a case, a trajectory of the moving concentrated parameter in space and time can be simply defined. We consider structures described by pure hyperbolic differential equations such as strings and structures described by hyperbolic-parabolic differential equations such as beams and plates. More complex structures such as frames, grids, shells, and three-dimensional objects, can be treated with the use of the solutions given in this book.

Coupled Vibrations of Beams Using a Semi-analytical Method Cambridge University Press

This text introduces the quantitative treatment of differential equations arising from modeling physical phenomena in chemical engineering. Coverage includes recent topics such as ODE-IVPs, emphasizing numerical methods and modeling of 1984-era commercial mathematical software.

The Effects of Globalization on Panamanian University System John Wiley & Sons

Advances in Engineering Materials, Structures and Systems: Innovations, Mechanics and Applications comprises 411 papers that were presented at SEMC 2019, the Seventh International Conference on Structural Engineering, Mechanics and Computation, held in Cape Town, South Africa, from 2 to 4 September 2019. The subject matter reflects the broad scope of SEMC conferences, and covers a wide variety of engineering materials (both traditional and innovative) and many types of structures. The many topics featured in these Proceedings can be classified into six broad categories that deal with: (i) the mechanics of materials and fluids (elasticity, plasticity, flow through porous media, fluid dynamics, fracture, fatigue, damage, delamination, corrosion, bond, creep, shrinkage, etc); (ii) the mechanics of structures and systems (structural dynamics, vibration, seismic response, soil-structure interaction, fluid-structure interaction, response to blast and impact, response to fire, structural stability, buckling, collapse behaviour); (iii) the numerical modelling and experimental testing of materials and structures (numerical methods, simulation techniques, multi-scale modelling, computational modelling, laboratory testing, field testing, experimental measurements); (iv) innovations and special structures (nanostructures, adaptive structures, smart structures, composite structures, bio-inspired structures, shell structures, membranes, space structures, lightweight structures, long-span structures, tall buildings, wind turbines, etc); (v) design in traditional engineering materials (steel, concrete, steel-concrete composite, aluminium, masonry, timber, glass); (vi) the process of structural engineering (conceptualisation, planning, analysis, design, optimization, construction, assembly, manufacture, testing, maintenance, monitoring, assessment, repair, strengthening, retrofitting, decommissioning). The SEMC 2019 Proceedings will be of interest to civil, structural, mechanical, marine and aerospace engineers. Researchers, developers, practitioners and academics in these disciplines will find them useful. Two versions of the papers are available. Short versions, intended to be concise but self-contained summaries of the full papers, are in this printed book. The full versions of the papers are in the e-book.

A Semi-analytical Method of Factorial Rotation to Simple Structure Courier Corporation

Examines numerical and semi-analytical methods for differential equations that can be used for solving practical ODEs and PDEs This student-friendly book deals with various approaches for solving differential equations numerically or semi-analytically depending on the type of equations and offers simple example problems to help readers along. Featuring both traditional and recent methods, Advanced Numerical and Semi Analytical Methods for Differential Equations begins with a review of basic numerical methods. It then looks at Laplace, Fourier, and weighted residual methods for solving differential equations. A new challenging method of Boundary Characteristics Orthogonal Polynomials (BCOPs) is introduced next. The book then discusses Finite Difference Method (FDM), Finite Element Method (FEM), Finite Volume Method (FVM), and Boundary Element Method (BEM). Following that, analytical/semi analytic methods like Akbari Ganji's Method (AGM) and Exp-function are used to solve nonlinear differential equations. Nonlinear differential equations using semi-analytical methods are also addressed, namely Adomian Decomposition Method (ADM), Homotopy Perturbation Method (HPM), Variational Iteration Method (VIM), and Homotopy Analysis Method (HAM). Other topics covered include: emerging areas of research related to the solution of differential equations based on differential quadrature and wavelet approach; combined and hybrid methods for solving differential equations; as well as an overview of fractal differential equations. Further, uncertainty in term of intervals and fuzzy numbers have also been included, along with the interval finite element method. This book: Discusses various methods for solving linear and nonlinear ODEs and PDEs Covers basic numerical techniques for solving differential equations along with various discretization methods Investigates nonlinear differential equations using semi-analytical methods Examines differential equations in an uncertain environment Includes a new scenario in which uncertainty (in term of intervals and fuzzy numbers) has been included in differential equations Contains solved example problems, as well as some unsolved problems for self-validation of the topics covered Advanced Numerical and Semi Analytical Methods for Differential Equations is an excellent text for graduate as well as post graduate students and researchers studying various methods for solving differential equations, numerically and semi-analytically.

A Semi-analytical Method to Predict Printed Circuit Board Package Temperatures BiblioGov

Examines numerical and semi-analytical methods for differential equations that can be used for solving practical ODEs and PDEs This student-friendly book deals with various approaches for solving differential equations numerically or semi-analytically depending on the type of equations and offers simple example problems to help readers along. Featuring both traditional and recent methods, Advanced Numerical and Semi Analytical Methods for Differential Equations begins with a review of basic numerical methods. It then looks at Laplace, Fourier, and weighted residual methods for solving differential equations. A new challenging method of Boundary Characteristics Orthogonal Polynomials (BCOPs) is introduced next. The book then discusses Finite Difference Method (FDM), Finite Element Method (FEM), Finite Volume Method (FVM), and Boundary Element Method (BEM). Following that, analytical/semi analytic methods like Akbari Ganji's Method (AGM) and Exp-function are used to solve nonlinear differential equations. Nonlinear differential equations using semi-analytical methods are also addressed, namely Adomian Decomposition Method (ADM), Homotopy Perturbation Method (HPM), Variational Iteration Method (VIM), and Homotopy Analysis Method (HAM). Other topics covered include: emerging areas of research related to the solution of differential equations based on differential quadrature and wavelet approach; combined and hybrid methods for solving differential equations; as well as an overview of fractal differential equations. Further, uncertainty in term of intervals and fuzzy numbers have also been included, along with the interval finite element method. This book: Discusses various methods for solving linear and nonlinear ODEs and PDEs Covers basic numerical techniques for solving differential equations along with various discretization methods Investigates nonlinear differential equations using semi-analytical methods Examines differential equations in an uncertain environment Includes a new scenario in which uncertainty (in term of intervals and fuzzy numbers) has been included in differential equations Contains solved example problems, as well

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A Contribution to the Practical Solution of Aerotriangulation by Semi-analytical Method John Wiley & Sons

This book provides an in-depth treatment of the study of the stability of engineering structures. Contributions from internationally recognized leaders in the field ensure a wide coverage of engineering disciplines in which structural stability is of importance, in particular the experimental, analytical and numerical modelling of structural stability applied to aeronautical, civil and marine structures. This second volume in buckling and postbuckling structures builds on the first, and reports on the development of fast semi-analytical methods for the rapid characterization of postbuckling structures; optimization approaches for the design of stiffened composite panels, and a discourse on imperfection sensitivity. This book will be a particularly useful reference to professional engineers, graduate students and researchers interested in structural stability.

The Use of a Semi-analytical Method for Matching Aquifer Influence Functions

Ultrasonic guided waves in solid media have become a critically important subject in nondestructive testing and structural health monitoring, as new faster, more sensitive, and more economical ways of looking at materials and structures have become possible. This book will lead to fresh creative ideas for use in new inspection procedures. Although the mathematics is sometimes sophisticated, the book can also be read by managers without detailed understanding of the concepts as it can be read from a 'black box' point of view. Overall, the material presented on wave mechanics - in particular, guided wave mechanics - establishes a framework for the creative data collection and signal processing needed to solve many problems using ultrasonic nondestructive evaluation and structural health monitoring. The book can be used as a reference in ultrasonic nondestructive evaluation by professionals and as a textbook for seniors and graduate students. This work extends the coverage of Rose's earlier book Ultrasonic Waves in Solid Media.

Advanced Numerical and Semi-Analytical Methods for Differential Equations

This book contains two sections: Chapters 1-7 deal with contact mechanics, and Chapters 8-13 deal with fracture mechanics. The different contributions of this book will cover the various advanced topics of research. It provides some needed background with respect to contact mechanics, fracture mechanics and the use of finite element methods in both. All the covered chapters of this book are of a theoretical and applied nature, suitable for the researchers of engineering, physics, applied mathematics and mechanics with an interest in computer simulation of contact and fracture problems.

A Semi-Analytical Method for Pricing and Hedging Continuously Sampled Arithmetic Average Rate Options

This paper studies the pricing and hedging of continuously sampled arithmetic average rate options. We derive a new analytical approximate formula to price and hedge the arithmetic average rate options. The correction to the analytical approximate formula is governed by a Partial Differential Equation (PDE) with smooth coefficients and zero initial condition, enabling it to be evaluated accurately by a numerical method. Numerical experiments show that the error of our semi-analytical method (ie, analytical approximation with the correction) is of the order of 10^{-7} for the grid size used in this paper, and the CPU time required for the numerical computation is only one second for a short-tenor option and 22 seconds for a long-tenor option. The accuracy can be improved further by reducing the grid size in a trade-off with CPU time. Our method is more accurate than any other method reported in the literature and it is faster than other PDE methods. With the error well controlled, our results can be used as a benchmark to justify the error computed by other approximation methods, including Monte Carlo simulation. [This article is a revised version of an earlier one entitled quot;Arithmetic Asian options with continuous sampling.quot;].

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