

Ordinary And Partial Differential Equations

By M D Raisinghania

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Scaling of Differential Equations - Hans

Petter Langtangen 2016-06-15

The book serves both as a reference for various scaled models with corresponding dimensionless numbers, and as a resource for learning the art of scaling. A special feature of the book is the emphasis on how to create software for scaled models, based on existing software for unscaled models. Scaling (or non-dimensionalization) is a mathematical technique that greatly simplifies the setting of input parameters in numerical simulations. Moreover, scaling enhances the understanding of how different physical processes interact in a differential equation model. Compared to the existing literature, where the topic of scaling is frequently encountered, but very often in only a brief and shallow setting, the present book gives much more thorough explanations of how to reason about finding the right scales. This process is highly problem dependent, and therefore the book features a lot of worked examples, from very simple ODEs to systems of PDEs, especially from fluid mechanics. The text is easily accessible and example-driven. The first part on ODEs fits even a lower undergraduate level, while the most advanced multiphysics fluid mechanics examples target the graduate level. The scientific literature is full of scaled models, but in most of the cases, the scales are just stated without thorough mathematical reasoning. This book explains how the scales are found mathematically. This book will be a valuable read for anyone doing numerical simulations based on ordinary or partial

differential equations.

ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS - NITA H. SHAH 2015-01-17

This revised and updated text, now in its second edition, continues to present the theoretical concepts of methods of solutions of ordinary and partial differential equations. It equips students with the various tools and techniques to model different physical problems using such equations. The book discusses the basic concepts of ordinary and partial differential equations. It contains different methods of solving ordinary differential equations of first order and higher degree. It gives the solution methodology for linear differential equations with constant and variable coefficients and linear differential equations of second order. The text elaborates simultaneous linear differential equations, total differential equations, and partial differential equations along with the series solution of second order linear differential equations. It also covers Bessel's and Legendre's equations and functions, and the Laplace transform. Finally, the book revisits partial differential equations to solve the Laplace equation, wave equation and diffusion equation, and discusses the methods to solve partial differential equations using the Fourier transform. A large number of solved examples as well as exercises at the end of chapters help the students comprehend and strengthen the underlying concepts. The book is intended for undergraduate and postgraduate students of Mathematics (B.A./B.Sc., M.A./M.Sc.), and undergraduate students of all branches of

engineering (B.E./B.Tech.), as part of their course in Engineering Mathematics. New to the SECOND Edition • Includes new sections and subsections such as applications of differential equations, special substitution (Lagrange and Riccati), solutions of non-linear equations which are exact, method of variation of parameters for linear equations of order higher than two, and method of undetermined coefficients • Incorporates several worked-out examples and exercises with their answers • Contains a new Chapter 19 on 'Z-Transforms and its Applications'.

Ordinary and Partial Differential Equations -
M.D.Raisinghania 2013

This book has been designed for Undergraduate (Honours) and Postgraduate students of various Indian Universities. A set of objective problems has been provided at the end of each chapter which will be useful to the aspirants of competitive examinations

Numerical Solution of Partial Differential Equations by the Finite Element Method -
Claes Johnson 2012-05-23

An accessible introduction to the finite element method for solving numeric problems, this volume offers the keys to an important technique in computational mathematics. Suitable for advanced undergraduate and graduate courses, it outlines clear connections with applications and considers numerous examples from a variety of science- and engineering-related specialties. This text encompasses all varieties of the basic linear partial differential equations, including elliptic, parabolic and hyperbolic problems, as well as stationary and time-dependent problems. Additional topics include finite element methods for integral equations, an introduction to nonlinear problems, and considerations of unique developments of finite element techniques related to parabolic problems, including methods for automatic time step control. The relevant mathematics are expressed in non-technical terms whenever possible, in the interests of keeping the treatment accessible to a majority of students.

Ordinary and Partial Differential Equation Routines in C, C++, Fortran, Java, Maple, and MATLAB -
H.J. Lee 2003-11-24

This book provides a set of ODE/PDE integration routines in the six most widely used computer

languages, enabling scientists and engineers to apply ODE/PDE analysis toward solving complex problems. This text concisely reviews integration algorithms, then analyzes the widely used Runge-Kutta method. It first presents a complete code before discussing

Uniqueness and Nonuniqueness Criteria for Ordinary Differential Equations -
Ratan Prakash Agarwal 1993

This monograph aims to fill a void by making available a source book which first systematically describes all the available uniqueness and nonuniqueness criteria for ordinary differential equations, and compares and contrasts the merits of these criteria, and second, discusses open problems and offers some directions towards possible solutions.

Introduction to Partial Differential Equations -
Gerald B. Folland 2020-05-26

The description for this book, Introduction to Partial Differential Equations. (MN-17), Volume 17, will be forthcoming.

Differential Equations with Boundary-value Problems -
Dennis G. Zill 2005

Now enhanced with the innovative DE Tools CD-ROM and the iLrn teaching and learning system, this proven text explains the "how" behind the material and strikes a balance between the analytical, qualitative, and quantitative approaches to the study of differential equations. This accessible text speaks to students through a wealth of pedagogical aids, including an abundance of examples, explanations, "Remarks" boxes, definitions, and group projects. This book was written with the student's understanding firmly in mind. Using a straightforward, readable, and helpful style, this book provides a thorough treatment of boundary-value problems and partial differential equations.

Introduction to Numerical Ordinary and Partial Differential Equations Using MATLAB -
Alexander Stanoyevitch 2011-10-14

Learn how to solve complex differential equations using MATLAB® Introduction to Numerical Ordinary and Partial Differential Equations Using MATLAB® teaches readers how to numerically solve both ordinary and partial differential equations with ease. This innovative publication brings together a skillful treatment of MATLAB and programming alongside theory and modeling. By presenting

these topics in tandem, the author enables and encourages readers to perform their own computer experiments, leading them to a more profound understanding of differential equations. The text consists of three parts: Introduction to MATLAB and numerical preliminaries, which introduces readers to the software and its graphical capabilities and shows how to use it to write programs Ordinary Differential Equations Partial Differential Equations All the tools needed to master using MATLAB to solve differential equations are provided and include: "Exercises for the Reader" that range from routine computations to more advanced conceptual and theoretical questions (solutions appendix included) Illustrative examples, provided throughout the text, that demonstrate MATLAB's powerful ability to solve differential equations Explanations that are rigorous, yet written in a very accessible, user-friendly style Access to an FTP site that includes downloadable files of all the programs developed in the text This textbook can be tailored for courses in numerical differential equations and numerical analysis as well as traditional courses in ordinary and/or partial differential equations. All the material has been classroom-tested over the course of many years, with the result that any self-learner with an understanding of basic single-variable calculus can master this topic. Systematic use is made of MATLAB's superb graphical capabilities to display and analyze results. An extensive chapter on the finite element method covers enough practical aspects (including mesh generation) to enable the reader to numerically solve general elliptic boundary value problems. With its thorough coverage of analytic concepts, geometric concepts, programs and algorithms, and applications, this is an unsurpassed pedagogical tool.

Ordinary and Partial Differential Equations -

Ravi P. Agarwal 2008-11-13

In this undergraduate/graduate textbook, the authors introduce ODEs and PDEs through 50 class-tested lectures. Mathematical concepts are explained with clarity and rigor, using fully worked-out examples and helpful illustrations. Exercises are provided at the end of each chapter for practice. The treatment of ODEs is developed in conjunction with PDEs and is aimed mainly towards applications. The book covers

important applications-oriented topics such as solutions of ODEs in form of power series, special functions, Bessel functions, hypergeometric functions, orthogonal functions and polynomials, Legendre, Chebyshev, Hermite, and Laguerre polynomials, theory of Fourier series. Undergraduate and graduate students in mathematics, physics and engineering will benefit from this book. The book assumes familiarity with calculus.

Ordinary and Partial Differential Equations, 20th Edition - Raisinghania M.D.

This well-acclaimed book, now in its twentieth edition, continues to offer an in-depth presentation of the fundamental concepts and their applications of ordinary and partial differential equations providing systematic solution techniques. The book provides step-by-step proofs of theorems to enhance students' problem-solving skill and includes plenty of carefully chosen solved examples to illustrate the concepts discussed.

Partial Differential Equations I - Michael E.

Taylor 2010-10-29

The first of three volumes on partial differential equations, this one introduces basic examples arising in continuum mechanics, electromagnetism, complex analysis and other areas, and develops a number of tools for their solution, in particular Fourier analysis, distribution theory, and Sobolev spaces. These tools are then applied to the treatment of basic problems in linear PDE, including the Laplace equation, heat equation, and wave equation, as well as more general elliptic, parabolic, and hyperbolic equations. The book is targeted at graduate students in mathematics and at professional mathematicians with an interest in partial differential equations, mathematical physics, differential geometry, harmonic analysis, and complex analysis.

Partial Differential Equations - Lawrence C. Evans 2010

This is the second edition of the now definitive text on partial differential equations (PDE). It offers a comprehensive survey of modern techniques in the theoretical study of PDE with particular emphasis on nonlinear equations. Its wide scope and clear exposition make it a great text for a graduate course in PDE. For this edition, the author has made numerous changes,

including a new chapter on nonlinear wave equations, more than 80 new exercises, several new sections, a significantly expanded bibliography. About the First Edition: I have used this book for both regular PDE and topics courses. It has a wonderful combination of insight and technical detail. ... Evans' book is evidence of his mastering of the field and the clarity of presentation. --Luis Caffarelli, University of Texas It is fun to teach from Evans' book. It explains many of the essential ideas and techniques of partial differential equations ... Every graduate student in analysis should read it. --David Jerison, MIT I use Partial Differential Equations to prepare my students for their Topic exam, which is a requirement before starting working on their dissertation. The book provides an excellent account of PDE's ... I am very happy with the preparation it provides my students. --Carlos Kenig, University of Chicago Evans' book has already attained the status of a classic. It is a clear choice for students just learning the subject, as well as for experts who wish to broaden their knowledge ... An outstanding reference for many aspects of the field. --Rafe Mazzeo, Stanford University

Stochastic Ordinary and Stochastic Partial Differential Equations - Peter Kotelenetz

2014-09-18

Stochastic Partial Differential Equations analyzes mathematical models of time-dependent physical phenomena on microscopic, macroscopic and mesoscopic levels. It provides a rigorous derivation of each level from the preceding one and examines the resulting mesoscopic equations in detail. Coverage first describes the transition from the microscopic equations to the mesoscopic equations. It then covers a general system for the positions of the large particles.

A Text Book of Differential Equations - N. M. Kapoor 1997

An Integral Part Of College Mathematics, Finds Application In Diverse Areas Of Science And Engineering. This Book Covers The Subject Of Ordinary And Partial Differential Equations In Detail. There Are Nineteen Chapters And Eight Appendices Covering Diverse Topics Including Numerical Solution Of First Order Equations, Existence Theorem, Solution In Series, Detailed Study Of Partial Differential Equations Of

Second Order Etc. This Book Fully Covers The Latest Requirement Of Graduation And Postgraduate Courses.

Markov Processes and Differential Equations -

Mark I. Freidlin 2012-12-06

Probabilistic methods can be applied very successfully to a number of asymptotic problems for second-order linear and non-linear partial differential equations. Due to the close connection between the second order differential operators with a non-negative characteristic form on the one hand and Markov processes on the other, many problems in PDE's can be reformulated as problems for corresponding stochastic processes and vice versa. In the present book four classes of problems are considered: - the Dirichlet problem with a small parameter in higher derivatives for differential equations and systems - the averaging principle for stochastic processes and PDE's - homogenization in PDE's and in stochastic processes - wave front propagation for semilinear differential equations and systems. From the probabilistic point of view, the first two topics concern random perturbations of dynamical systems. The third topic, homogenization, is a natural problem for stochastic processes as well as for PDE's. Wave fronts in semilinear PDE's are interesting examples of pattern formation in reaction-diffusion equations. The text presents new results in probability theory and their application to the above problems. Various examples help the reader to understand the effects. Prerequisites are knowledge in probability theory and in partial differential equations.

Introduction to Applied Partial Differential Equations - John M. Davis 2012-01-06

Drawing on his decade of experience teaching the differential equations course, John Davis offers a refreshing and effective new approach to partial differential equations that is equal parts computational proficiency, visualization, and physical interpretation of the problem at hand.

Partial Differential Equations and Boundary-Value Problems with Applications - Mark A. Pinsky 2011

Building on the basic techniques of separation of variables and Fourier series, the book presents the solution of boundary-value problems for

basic partial differential equations: the heat equation, wave equation, and Laplace equation, considered in various standard coordinate systems--rectangular, cylindrical, and spherical. Each of the equations is derived in the three-dimensional context; the solutions are organized according to the geometry of the coordinate system, which makes the mathematics especially transparent. Bessel and Legendre functions are studied and used whenever appropriate throughout the text. The notions of steady-state solution of closely related stationary solutions are developed for the heat equation; applications to the study of heat flow in the earth are presented. The problem of the vibrating string is studied in detail both in the Fourier transform setting and from the viewpoint of the explicit representation (d'Alembert formula). Additional chapters include the numerical analysis of solutions and the method of Green's functions for solutions of partial differential equations. The exposition also includes asymptotic methods (Laplace transform and stationary phase). With more than 200 working examples and 700 exercises (more than 450 with answers), the book is suitable for an undergraduate course in partial differential equations.

Introduction to Differential Equations: Second Edition - Michael E. Taylor 2021-10-21

This text introduces students to the theory and practice of differential equations, which are fundamental to the mathematical formulation of problems in physics, chemistry, biology, economics, and other sciences. The book is ideally suited for undergraduate or beginning graduate students in mathematics, and will also be useful for students in the physical sciences and engineering who have already taken a three-course calculus sequence. This second edition incorporates much new material, including sections on the Laplace transform and the matrix Laplace transform, a section devoted to Bessel's equation, and sections on applications of variational methods to geodesics and to rigid body motion. There is also a more complete treatment of the Runge-Kutta scheme, as well as numerous additions and improvements to the original text. Students finishing this book will be well prepared

Ordinary and Partial Differential Equations - Patrick McCann 2020-09-08

The statement which expresses the equality of two expressions is known as an equation. A differential equation is a kind of mathematical equation that shows the connection between a function and its derivatives. Functions represent the physical quantities and derivatives show their rates of change. The differential equation seeks to define the relationship between the two. It can be classified into various types such as ordinary differential equations and partial differential equations. Ordinary differential equation contains one or more than one function of an independent variable. It is related to the derivatives of these functions. Partial differential equations contain unknown multi-variable functions as well as their partial derivatives. These are generally used to formulate problems which contain functions of several variables. The topics included in this book on ordinary and partial differential equations are of utmost significance and bound to provide incredible insights to readers. It presents researches and studies performed by experts across the globe. This book is appropriate for students seeking detailed information in this area as well as for experts.

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.

Ordinary and Partial Differential Equations - 1996

Partial Differential Equations III - 1991

Introduction to Partial Differential Equations - Aslak Tveito 2008-01-21

Combining both the classical theory and numerical techniques for partial differential equations, this thoroughly modern approach shows the significance of computations in PDEs and illustrates the strong interaction between mathematical theory and the development of

numerical methods. Great care has been taken throughout the book to seek a sound balance between these techniques. The authors present the material at an easy pace and exercises ranging from the straightforward to the challenging have been included. In addition there are some "projects" suggested, either to refresh the students memory of results needed in this course, or to extend the theories developed in the text. Suitable for undergraduate and graduate students in mathematics and engineering.

Introduction to Partial Differential Equations - Peter J. Olver 2013-11-08

This textbook is designed for a one year course covering the fundamentals of partial differential equations, geared towards advanced undergraduates and beginning graduate students in mathematics, science, engineering, and elsewhere. The exposition carefully balances solution techniques, mathematical rigor, and significant applications, all illustrated by numerous examples. Extensive exercise sets appear at the end of almost every subsection, and include straightforward computational problems to develop and reinforce new techniques and results, details on theoretical developments and proofs, challenging projects both computational and conceptual, and supplementary material that motivates the student to delve further into the subject. No previous experience with the subject of partial differential equations or Fourier theory is assumed, the main prerequisites being undergraduate calculus, both one- and multi-variable, ordinary differential equations, and basic linear algebra. While the classical topics of separation of variables, Fourier analysis, boundary value problems, Green's functions, and special functions continue to form the core of an introductory course, the inclusion of nonlinear equations, shock wave dynamics, symmetry and similarity, the Maximum Principle, financial models, dispersion and solutions, Huygens' Principle, quantum mechanical systems, and more make this text well attuned to recent developments and trends in this active field of contemporary research. Numerical approximation schemes are an important component of any introductory course, and the text covers the two most basic approaches: finite

differences and finite elements.

Ordinary Differential Equations - Morris Tenenbaum 1985-10-01

Skillfully organized introductory text examines origin of differential equations, then defines basic terms and outlines the general solution of a differential equation. Subsequent sections deal with integrating factors; dilution and accretion problems; linearization of first order systems; Laplace Transforms; Newton's Interpolation Formulas, more.

Nonlinear Analysis, Differential Equations, and Applications - Themistocles M. Rassias 2021-08-20

This contributed volume showcases research and survey papers devoted to a broad range of topics on functional equations, ordinary differential equations, partial differential equations, stochastic differential equations, optimization theory, network games, generalized Nash equilibria, critical point theory, calculus of variations, nonlinear functional analysis, convex analysis, variational inequalities, topology, global differential geometry, curvature flows, perturbation theory, numerical analysis, mathematical finance and a variety of applications in interdisciplinary topics. Chapters in this volume investigate compound superquadratic functions, the Hyers-Ulam Stability of functional equations, edge degenerate pseudo-hyperbolic equations, Kirchhoff wave equation, BMO norms of operators on differential forms, equilibrium points of the perturbed R3BP, complex zeros of solutions to second order differential equations, a higher-order Ginzburg-Landau-type equation, multi-symplectic numerical schemes for differential equations, the Erdős-Rényi network model, strongly m-convex functions, higher order strongly generalized convex functions, factorization and solution of second order differential equations, generalized topologically open sets in relator spaces, graphical mean curvature flow, critical point theory in infinite dimensional spaces using the Leray-Schauder index, non-radial solutions of a supercritical equation in expanding domains, the semi-discrete method for the approximation of the solution of stochastic differential equations, homotopic metric-interval L-contractions in gauge spaces, Rhoades contractions theory,

network centrality measures, the Radon transform in three space dimensions via plane integration and applications in positron emission tomography boundary perturbations on medical monitoring and imaging techniques, the KdV-B equation and biomedical applications.

Analytic Methods for Partial Differential Equations - G. Evans 2012-12-06

This is the practical introduction to the analytical approach taken in Volume 2. Based upon courses in partial differential equations over the last two decades, the text covers the classic canonical equations, with the method of separation of variables introduced at an early stage. The characteristic method for first order equations acts as an introduction to the classification of second order quasi-linear problems by characteristics. Attention then moves to different co-ordinate systems, primarily those with cylindrical or spherical symmetry. Hence a discussion of special functions arises quite naturally, and in each case the major properties are derived. The next section deals with the use of integral transforms and extensive methods for inverting them, and concludes with links to the use of Fourier series.

Ordinary Differential Equations in the Complex Domain - Einar Hille 1997-01-01

Graduate-level text offers full treatments of existence theorems, representation of solutions by series, theory of majorants, dominants and minorants, questions of growth, much more. Includes 675 exercises. Bibliography.

Differential Equations and Group Methods for Scientists and Engineers - James M. Hill 1992-03-17

Differential Equations and Group Methods for Scientists and Engineers presents a basic introduction to the technically complex area of invariant one-parameter Lie group methods and their use in solving differential equations. The book features discussions on ordinary differential equations (first, second, and higher order) in addition to partial differential equations (linear and nonlinear). Each chapter contains worked examples with several problems at the end; answers to these problems and hints on how to solve them are found at the back of the book. Students and professionals in mathematics, science, and engineering will find this book indispensable for developing a

fundamental understanding of how to use invariant one-parameter group methods to solve differential equations.

Ordinary and Partial Differential Equations - P Smith 1997-07-16

These conference proceedings include papers by a number of experts with a common interest in differential equations and their application in physical and biological systems. Topics covered include direct and inverse electromagnetic scattering techniques, spatial epidemic models, wound healing, chemotaxis and reaction-diffusion equations, dynamics and stability of thin liquid films, and a contemporary formulation of symmetric linear differential equations.

Analytic Methods for Partial Differential Equations - G. Evans 1999-11-01

This is the practical introduction to the analytical approach taken in Volume 2. Based upon courses in partial differential equations over the last two decades, the text covers the classic canonical equations, with the method of separation of variables introduced at an early stage. The characteristic method for first order equations acts as an introduction to the classification of second order quasi-linear problems by characteristics. Attention then moves to different co-ordinate systems, primarily those with cylindrical or spherical symmetry. Hence a discussion of special functions arises quite naturally, and in each case the major properties are derived. The next section deals with the use of integral transforms and extensive methods for inverting them, and concludes with links to the use of Fourier series.

Elements of Partial Differential Equations - Ian N. Sneddon 2006-01-01

Geared toward students of applied rather than pure mathematics, this volume introduces elements of partial differential equations. Its focus is primarily upon finding solutions to particular equations rather than general theory. Topics include ordinary differential equations in more than two variables, partial differential equations of the first and second orders, Laplace's equation, the wave equation, and the diffusion equation. A helpful Appendix offers information on systems of surfaces, and solutions to the odd-numbered problems appear at the end of the book. Readers pursuing

independent study will particularly appreciate the worked examples that appear throughout the text.

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.

Special Functions and Analysis of Differential Equations - Praveen Agarwal 2020-09-08

Differential Equations are very important tools in Mathematical Analysis. They are widely found in mathematics itself and in its applications to statistics, computing, electrical circuit analysis, dynamical systems, economics, biology, and so on. Recently there has been an increasing interest in and widely-extended use of differential equations and systems of fractional order (that is, of arbitrary order) as better models of phenomena in various physics, engineering, automatization, biology and biomedicine, chemistry, earth science, economics, nature, and so on. Now, new unified presentation and extensive development of special functions associated with fractional calculus are necessary tools, being related to the

theory of differentiation and integration of arbitrary order (i.e., fractional calculus) and to the fractional order (or multi-order) differential and integral equations. This book provides learners with the opportunity to develop an understanding of advancements of special functions and the skills needed to apply advanced mathematical techniques to solve complex differential equations and Partial Differential Equations (PDEs). Subject matters should be strongly related to special functions involving mathematical analysis and its numerous applications. The main objective of this book is to highlight the importance of fundamental results and techniques of the theory of complex analysis for differential equations and PDEs and emphasizes articles devoted to the mathematical treatment of questions arising in physics, chemistry, biology, and engineering, particularly those that stress analytical aspects and novel problems and their solutions. Specific topics include but are not limited to Partial differential equations Least squares on first-order system Sequence and series in functional analysis Special functions related to fractional (non-integer) order control systems and equations Various special functions related to generalized fractional calculus Operational method in fractional calculus Functional analysis and operator theory Mathematical physics Applications of numerical analysis and applied mathematics Computational mathematics Mathematical modeling This book provides the recent developments in special functions and differential equations and publishes high-quality, peer-reviewed book chapters in the area of nonlinear analysis, ordinary differential equations, partial differential equations, and related applications. Ordinary Differential Equations - Jack K. Hale 2009-01-01

This rigorous treatment prepares readers for the study of differential equations and shows them how to research current literature. It emphasizes nonlinear problems and specific analytical methods. 1969 edition.

Ordinary and Partial Differential Equations - Taylor & Francis Group 2019-08-30

Covers ODEs and PDEs--in One Textbook Until now, a comprehensive textbook covering both ordinary differential equations (ODEs) and

partial differential equations (PDEs) didn't exist. Fulfilling this need, *Ordinary and Partial Differential Equations* provides a complete and accessible course on ODEs and PDEs using many examples and exercises as well as intuitive, easy-to-use software. Teaches the Key Topics in Differential Equations The text includes all the topics that form the core of a modern undergraduate or beginning graduate course in differential equations. It also discusses other optional but important topics such as integral equations, Fourier series, and special functions. Numerous carefully chosen examples offer practical guidance on the concepts and techniques. Guides Students through the Problem-Solving Process Requiring no user programming, the accompanying computer software allows students to fully investigate problems, thus enabling a deeper study into the role of boundary and initial conditions, the dependence of the solution on the parameters, the accuracy of the solution, the speed of a series convergence, and related questions. The ODE module compares students' analytical solutions to the results of computations while the PDE module demonstrates the sequence of all necessary analytical solution steps.

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.

Introduction to Partial Differential Equations with Applications - E. C.

Zachmanoglou 2012-04-20

This text explores the essentials of partial differential equations as applied to engineering and the physical sciences. Discusses ordinary differential equations, integral curves and surfaces of vector fields, the Cauchy-Kovalevsky theory, more. Problems and answers.

Ordinary and Partial Differential Equations - John W. Cain 2010-08-01

Differential equations arise in a variety of contexts, some purely theoretical and some of practical interest. As you read this textbook, you will find that the qualitative and quantitative study of differential equations incorporates an elegant blend of linear algebra and advanced calculus. This book is intended for an advanced undergraduate course in differential equations. The reader should have already completed courses in linear algebra, multivariable calculus, and introductory differential equations.