

Differential Equations A Primer For Scientists And Engineers Springer Undergraduate Texts In Mathematics And Technology

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Biology in Time and Space: A Partial Differential Equation Modeling Approach

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A Primer

Differential Equations

An Introduction to Ordinary Differential Equations

An Elementary Textbook for Students of Mathematics, Engineering, and the Sciences

A Mathematica Primer for Physicists

Applied Partial Differential Equations

Differential Equations

A Primer for Scientists and Engineers

A First Course in Differential Equations

Tensors, Differential Forms, and Variational Principles

A Concise Course

A Primer of Algebraic D-Modules

A Primer in Mathematical Models in Biology

A Primer on PDEs

Solving Differential Equations in R

A Numerical Primer for the Chemical Engineer, Second Edition

A PRIMER ON FUNCTIONAL DIFFERENTIAL EQUATIONS WITH APPLICATIONS TO ECONOMICS

A Primer for Scientists and Engineers

A Primer of Real Analytic Functions

With an Introduction to Differential Equations

Differential Equations A Primer For Scientists And Engineers Springer Undergraduate Texts In Mathematics And Technology

OMB No. 8362767450192 edited by

PORTER SANTOS

Maple CRC Press

Provides simple explanations of the important concepts in population and community ecology.

Provides R code throughout, to illustrate model development and analysis, as well as appendix introducing the R language. Interweaves ecological content and code so that either stands alone. Supplemental web site for additional code.

BIOLOGY IN TIME AND SPACE: A PARTIAL DIFFERENTIAL EQUATION MODELING APPROACH

Springer Science & Business Media

This book provides a self-contained introduction to ordinary differential equations and dynamical systems suitable for beginning graduate students. The first part begins with some simple examples of explicitly solvable equations and a first glance at qualitative methods. Then the fundamental results concerning the initial value problem are proved: existence, uniqueness, extensibility, dependence on initial conditions. Furthermore, linear equations are considered, including the Floquet theorem, and some perturbation results. As somewhat independent topics, the Frobenius method for linear equations in the complex domain is established and Sturm-Liouville boundary value problems, including oscillation theory, are investigated. The second part introduces the concept of a dynamical system. The Poincare-Bendixson theorem is proved, and several examples of planar systems from classical mechanics, ecology, and electrical engineering are investigated. Moreover, attractors, Hamiltonian systems, the KAM theorem, and periodic solutions are discussed. Finally, stability is studied, including the stable manifold and the Hartman-Grobman theorem for both continuous and discrete systems. The third part introduces chaos, beginning with the basics for iterated interval maps and ending with the Smale-Birkhoff theorem and the Melnikov method for homoclinic orbits. The text contains almost three hundred exercises. Additionally, the use of mathematical software systems is incorporated throughout, showing how they can help in the study of differential equations.

A MINICOURSE ON STOCHASTIC PARTIAL DIFFERENTIAL EQUATIONS

Academic Press

Partial differential equations (PDEs) play an important role in the natural sciences and technology, because they describe the way systems (natural and other) behave. The inherent suitability of PDEs to characterizing the nature, motion, and evolution of systems, has led to their wide-ranging use in numerical models that are developed in order to analyze systems that are not otherwise easily studied. Numerical Solutions for Partial Differential Equations contains all the details necessary for the reader to understand the principles and applications of advanced numerical methods for solving PDEs. In addition, it shows how the modern computer system algebra Mathematica® can be used for the analytic investigation of such numerical properties as stability, approximation, and dispersion.

A Primer Cambridge University Press

There are many excellent text books on elementary differential equations designed for the standard sophomore course. However, in spite of the fact that most courses are one semester in length, the texts have evolved into calculus-like presentations that include a large collection of methods and applications, packaged with student manuals, and Web-based notes, projects, and supplements. All of this comes in several hundred pages of text with busy formats. Most students do not have the time or desire to read voluminous texts and explore internet supplements. The format of this differential equations book is different; it is a one-semester, brief treatment of the basic ideas, models, and solution methods. Its limited coverage places it somewhere between an outline and a detailed textbook. I have tried to write concisely, to the point, and in plain language. Many worked examples and exercises are included. A student who works through this primer will have the tools to go to the next level in applying differential equations to problems in engineering, science, and applied mathematics. It can

give some instructors, who want more concise coverage, an alternative to existing texts.

DIFFERENTIAL EQUATIONS

Walter de Gruyter GmbH & Co KG

Mathematics plays an important role in many scientific and engineering disciplines. This book deals with the numerical solution of differential equations, a very important branch of mathematics. Our aim is to give a practical and theoretical account of how to solve a large variety of differential equations, comprising ordinary differential equations, initial value problems and boundary value problems, differential algebraic equations, partial differential equations and delay differential equations. The solution of differential equations using R is the main focus of this book. It is therefore intended for the practitioner, the student and the scientist, who wants to know how to use R for solving differential equations. However, it has been our goal that non-mathematicians should at least understand the basics of the methods, while obtaining entrance into the relevant literature that provides more mathematical background. Therefore, each chapter that deals with R examples is preceded by a chapter where the theory behind the numerical methods being used is introduced. In the sections that deal with the use of R for solving differential equations, we have taken examples from a variety of disciplines, including biology, chemistry, physics, pharmacokinetics. Many examples are well-known test examples, used frequently in the field of numerical analysis.

AN INTRODUCTION TO ORDINARY DIFFERENTIAL EQUATIONS

American Mathematical Soc.

Collective Behavior In Systems Biology: A Primer on Modeling Infrastructure offers a survey of established and emerging methods for quantifying process behavior in cellular systems. It introduces and applies mathematics and related abstract methods to processes in biological systems - why they are used, how they work, and what they mean. Emphasizing differential equations in an interdisciplinary approach, this book discusses infrastructure for kinetic modeling, technological system and control theories, optimization, and process behavior in cellular networks. The knowledge that the reader gains will be valuable for entering and keeping up with a rapidly developing discipline. Introduces basics of mathematical and abstract methods for understanding, predicting, and modifying collective behavior in cellular systems Targets biomedical professionals as well as computational specialists who are willing to take advantage of novel high-throughput data acquisition technologies

An Elementary Textbook for Students of Mathematics, Engineering, and the Sciences Springer

Designed as an introduction to numerical methods for students, this book combines mathematical correctness with numerical performance, and concentrates on numerical methods and problem solving. It applies actual numerical solution strategies to formulated process models to help identify and solve chemical engineering problems. Second edition comes with additional chapter on numerical integration and section on boundary value problems in the relevant chapter. Additional material on general modelling principles, mass/energy balances and separate section on DAE's is also included. Case study section has been extended with additional examples.

A Mathematica Primer for Physicists Courier Corporation

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

Applied Partial Differential Equations Springer Science & Business Media

Mathematics and engineering are inevitably interrelated, and this interaction will steadily increase

as the use of mathematical modelling grows. Although mathematicians and engineers often misunderstand one another, their basic approach is quite similar, as is the historical development of their respective disciplines. The purpose of this Math Primer is to provide a brief introduction to those parts of mathematics which are, or could be, useful in engineering, especially bioengineering. The aim is to summarize the ideas covered in each subject area without going into exhaustive detail. Formulas and equations have not been avoided, but every effort has been made to keep them simple in the hope of persuading readers that they are not only useful but also accessible. The wide range of topics covered includes introductory material such as numbers and sequences, geometry in two and three dimensions, linear algebra, and the calculus. Building on these foundations, linear spaces, tensor analysis and Fourier analysis are introduced. All these concepts are used to solve problems for ordinary and partial differential equations. Illustrative applications are taken from a variety of engineering disciplines, and the choice of a suitable model is considered from the point of view of both the mathematician and the engineer. This book will be of interest to engineers and bioengineers looking for the mathematical means to help further their work, and it will offer readers a glimpse of many ideas which may spark their interest.

Differential Equations Cambridge University Press

Differential Equations A Primer for Scientists and Engineers Springer

A PRIMER FOR SCIENTISTS AND ENGINEERS

Birkhäuser

How do biological objects communicate, make structures, make measurements and decisions, search for food, i.e., do all the things necessary for survival? Designed for an advanced undergraduate audience, this book uses mathematics to begin to tell that story. It builds on a background in multivariable calculus, ordinary differential equations, and basic stochastic processes and uses partial differential equations as the framework within which to explore these questions.

CRC Press

The fun and easy way to understand and solve complex equations Many of the fundamental laws of physics, chemistry, biology, and economics can be formulated as differential equations. This plain-English guide explores the many applications of this mathematical tool and shows how differential equations can help us understand the world around us. *Differential Equations For Dummies* is the perfect companion for a college differential equations course and is an ideal supplemental resource for other calculus classes as well as science and engineering courses. It offers step-by-step techniques, practical tips, numerous exercises, and clear, concise examples to help readers improve their differential equation-solving skills and boost their test scores.

A First Course in Differential Equations Springer Science & Business Media

Key topics in the theory of real analytic functions are covered in this text, and are rather difficult to pry out of the mathematics literature.; This expanded and updated 2nd ed. will be published out of Boston in Birkhäuser Advanced Texts series.; Many historical remarks, examples, references and an excellent index should encourage the reader study this valuable and exciting theory.; Superior advanced textbook or monograph for a graduate course or seminars on real analytic functions.; New to the second edition a revised and comprehensive treatment of the Faà de Bruno formula, topologies on the space of real analytic functions.; alternative characterizations of real analytic functions, surjectivity of partial differential operators, And the Weierstrass preparation theorem. *Tensors, Differential Forms, and Variational Principles* Springer Science & Business Media

This book introduces D-modules and their applications avoiding all unnecessary over-sophistication.

A Concise Course Courier Corporation

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.

A Primer of Algebraic D-Modules Springer Nature

Transforms and Applications Primer for Engineers with Examples and MATLAB® is required reading for engineering and science students, professionals, and anyone working on problems involving transforms. This invaluable primer contains the most essential integral transforms that both practicing engineers and students need to understand. It provides a large number of examples to explain the use of transforms in different areas, including circuit analysis, differential equations, signals and systems, and mechanical vibrations. Includes an appendix with suggestions and explanations to help you optimize your use of MATLAB Laplace and Fourier transforms are by far the most widely used and most useful of all integral transforms, so they are given a more extensive treatment in this book, compared to other texts that include them. Offering numerous MATLAB functions created by the author, this comprehensive book contains several appendices to complement the main subjects. Perhaps the most important feature is the extensive tables of transforms, which are provided to supplement the learning process. This book presents advanced material in a format that makes it easier to understand, further enhancing its immense value as a teaching tool for engineers and research scientists in academia and industry, as well as students in science and engineering.

A PRIMER IN MATHEMATICAL MODELS IN BIOLOGY

Springer

This textbook is designed with the needs of today's student in mind. It is the ideal textbook for a first course in elementary differential equations for future engineers and scientists, including mathematicians. This book is accessible to anyone who has a basic knowledge of precalculus algebra and differential and integral calculus. Its carefully crafted text adopts a concise, simple, no-frills approach to differential equations, which helps students acquire a solid experience in many classical solution techniques. With a lighter accent on the physical interpretation of the results, a more manageable page count than comparable texts, a highly readable style, and over 1000 exercises designed to be solved without a calculating device, this book emphasizes the understanding and practice of essential topics in a succinct yet fully rigorous fashion. Apart from several other enhancements, the second edition contains one new chapter on numerical methods of solution. The book formally splits the "pure" and "applied" parts of the contents by placing the discussion of selected mathematical models in separate chapters. At the end of most of the 246 worked examples, the author provides the commands in Mathematica® for verifying the results. The book can be used independently by the average student to learn the fundamentals of the subject, while those interested in pursuing more advanced material can regard it as an easily taken first step on the way to the next level. Additionally, practitioners who encounter differential equations in their professional work will find this text to be a convenient source of reference.

A Primer on PDEs Morgan & Claypool Publishers

This text is written for the standard, one-semester, undergraduate course in elementary partial differential equations. The topics include derivations of some of the standard equations of mathematical physics (including the heat equation, the wave equation, and Laplace's equation) and methods for solving those equations on bounded and unbounded domains. Methods include eigenfunction expansions, or separation of variables, and methods based on Fourier and Laplace transforms.

SOLVING DIFFERENTIAL EQUATIONS IN R

Springer Science & Business Media

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.

A Numerical Primer for the Chemical Engineer, Second Edition Courier Corporation

Maple is a comprehensive symbolic mathematics application which is well suited for demonstrating physical science topics and solving associated problems. Because Maple is such a rich application, it has a somewhat steep learning curve. Most existing texts concentrate on mathematics; the Maple help facility is too detailed and lacks physical science examples, many Maple-related websites are out of date giving readers information on older Maple versions. This book records the author's journey of discovery; he was familiar with SMath but not with Maple and set out to learn the more advanced application. It leads readers through the basic Maple features with physical science worked examples, giving them a firm base on which to build if more complex features interest them.

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