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DOI: 10.1137/1.9780898719987 Corpus ID: 59720213. A First Course on Numerical Methods @inproceedings{Ascher2011AFC, title={A First Course on Numerical Methods}, author={U. Ascher and Chen Greif}, year={2011} }

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Uri Ascher and Chen Greif, A First Course in Numerical Methods , SIAM, 2011. This is an undergraduate or beginning graduate introductory textbook on numerical methods. Errata . Supplementary material including matlab programs ; Earlier Books . Uri Ascher, 2008, Numerical Methods for Evolutionary Differential Equations

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Abstract—In the present paper some recommendations for the use of software package “Mathematica ” in a basic numerical analysis course are presented. The methods which are covered in the course include solution of systems of linear equations, nonlinear equations and systems of nonlinear equations, numerical integration, interpolation and solution of ordinary differential equations.

~~A First Course in Numerical Methods with “Mathematica” — CORE~~

Iserles, A., A First Course in the Numerical Analysis of Differential Equations. Cambridge University Press, Cambridge, 2008 Google Scholar. Ji, H., Chen, J., and Li, Z., A symmetric and consistent immersed finite element method for interface problems. J.

~~Numerical Solution of Differential Equations by Zhilin Li~~

A First Course in Ordinary Differential Equations. Presents a modern introduction to analytical and numerical techniques for solving ordinary differential equations. Provides a variety of problems to help students test and deepen their knowledge. A valuable resource for physicists, chemists, biologists, computer scientists and engineers, as well as for students whose work involves solving ODEs.

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lead the reader to a theoretical understanding of the subject without neglecting its practical aspects. The outcome is a textbook that is mathematically honest and rigorous and provides its target audience with a wide range of skills in both ordinary and partial differential equations." --Book Jacket.

This book presents a modern introduction to analytical and numerical techniques for solving ordinary differential equations (ODEs). Contrary to the traditional format—the theorem-and-proof format—the book is focusing on analytical and numerical methods. The book supplies a variety of problems and examples, ranging from the elementary to the advanced level, to introduce and study the mathematics of ODEs. The analytical part of the book deals with solution techniques for scalar first-order and second-order linear ODEs, and systems of linear ODEs—with a special focus on the Laplace transform, operator techniques and power series solutions. In the numerical part, theoretical and practical aspects of Runge-Kutta methods for solving initial-value problems and shooting methods for linear two-point boundary-value problems are considered. The book is intended as a primary text for courses on the theory of ODEs and numerical treatment of ODEs for advanced undergraduate and early graduate students. It is assumed that the reader has a basic grasp of elementary calculus, in particular methods of integration, and of numerical analysis. Physicists, chemists, biologists, computer scientists and engineers whose work involves solving ODEs will also find the book useful as a reference work and tool for independent study. The book has been prepared within the framework of a German-Iranian research project on mathematical methods for ODEs, which was started in early 2012.

Since the original publication of this book, available computer power has increased greatly. Today, scientific computing is playing an ever more prominent role as a tool in scientific discovery and engineering analysis. In this second edition, the key addition is an introduction to the finite element method. This is a widely used technique for solving partial differential equations (PDEs) in complex domains. This text introduces numerical methods and shows how to develop, analyse, and use them. Complete MATLAB programs for all the worked examples are now available at www.cambridge.org/Moin, and more than 30 exercises have been added. This thorough and practical book is intended as a first course in numerical analysis, primarily for new graduate students in engineering and physical science. Along with mastering the fundamentals of numerical methods, students will learn to write their own computer programs using standard numerical methods.

Numerical Methods for Ordinary Differential Equations is a self-contained introduction to a fundamental field of numerical analysis and scientific computation. Written for undergraduate students with a mathematical background, this book focuses on the analysis of numerical methods without losing sight of

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the practical nature of the subject. It covers the topics traditionally treated in a first course, but also highlights new and emerging themes. Chapters are broken down into 'lecture' sized pieces, motivated and illustrated by numerous theoretical and computational examples. Over 200 exercises are provided and these are starred according to their degree of difficulty. Solutions to all exercises are available to authorized instructors. The book covers key foundation topics: o Taylor series methods o Runge--Kutta methods o Linear multistep methods o Convergence o Stability and a range of modern themes: o Adaptive stepsize selection o Long term dynamics o Modified equations o Geometric integration o Stochastic differential equations The prerequisite of a basic university-level calculus class is assumed, although appropriate background results are also summarized in appendices. A dedicated website for the book containing extra information can be found via www.springer.com

Praise for the First Edition ". . . outstandingly appealing with regard to its style, contents, considerations of requirements of practice, choice of examples, and exercises." -Zentralblatt Math ". . . carefully structured with many detailed worked examples . . ." -The Mathematical Gazette ". . . an up-to-date and user-friendly account . . ." -Mathematika An Introduction to Numerical Methods and Analysis addresses the mathematics underlying approximation and scientific computing and successfully explains where approximation methods come from, why they sometimes work (or don't work), and when to use one of the many techniques that are available. Written in a style that emphasizes readability and usefulness for the numerical methods novice, the book begins with basic, elementary material and gradually builds up to more advanced topics. A selection of concepts required for the study of computational mathematics is introduced, and simple approximations using Taylor's Theorem are also treated in some depth. The text includes exercises that run the gamut from simple hand computations, to challenging derivations and minor proofs, to programming exercises. A greater emphasis on applied exercises as well as the cause and effect associated with numerical mathematics is featured throughout the book. An Introduction to Numerical Methods and Analysis is the ideal text for students in advanced undergraduate mathematics and engineering courses who are interested in gaining an understanding of numerical methods and numerical analysis.

An elementary first course for students in mathematics and engineering Practical in approach: examples of code are provided for students to debug, and tasks - with full solutions - are provided at the end of each chapter Includes a glossary of useful terms, with each term supported by an example of the syntaxes commonly encountered

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This new book updates the exceptionally popular Numerical Analysis of Ordinary Differential Equations. "This book is...an indispensable reference for any researcher."-American Mathematical Society on the First Edition. Features: * New exercises included in each chapter. * Author is widely regarded as the world expert on Runge-Kutta methods * Didactic aspects of the book have been enhanced by interspersing the text with exercises. * Updated Bibliography.

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