Ebook free The lattice boltzmann equation for fluid dynamics and beyond numerical mathematics and scientific computation by succi sauro 2013 paperback (PDF)

Projects in Scientific Computation Numerical Methods in Scientific Computing: Scientific Computation Numerical Analysis and Scientific Computation A Gentle Introduction to Scientific Computing Guide to Scientific Computing Scientific Computing Introduction to High Performance Scientific Computing An Introduction to Scientific Computing Scientific Computing Numerical Analysis Data-Driven Modeling & Scientific Computation Numerical Analysis in Modern Scientific Computing Scientific Computing A First Course in Scientific Computing Introduction to Scientific Computing and Data Analysis A New Approach to Scientific Computation Scientific Computing with Python Scientific Computation with Automatic Result Verification Accuracy and Reliability in Scientific Computing Introduction to Scientific Computing Scientific Computation on Mathematical Problems and Conjectures Scientific Computing with MATLAB Elements of Scientific Computing Introduction to Scientific Computing Scientific Computing and Differential Equations Mathematical Principles for Scientific Computing and Visualization Numerical Recipes 3rd Edition Scientific Computing with Mathematica® Introduction to High Performance Scientific Computing Numerical Methods in Scientific Computing Fundamentals of Scientific Computing Computation in Science An Introduction to High-performance Scientific Computing Scientific Computing with MATLAB Practical Numerical and Scientific Computing with MATLAB® and Python Scientific Computing with MATLAB and Octave Solving Problems in Scientific Computing Using Maple and MATLAB® Advances in Software Tools for Scientific Computing Essentials of Scientific Computing

Projects in Scientific Computation

2000-06-22

this interdisciplinary book provides a compendium of projects plus numerous example programs for readers to study and explore designed for advanced undergraduates or graduates of science mathematics and engineering who will deal with scientific computation in their future studies and research it also contains new and useful reference materials for researchers the problem sets range from the tutorial to exploratory and at times to the impossible the projects were collected from research results and computational dilemmas during the authors tenure as chief scientist at next computer and from his lectures at reed college the content assumes familiarity with such college topics as calculus differential equations and at least elementary programming each project focuses on computation theory graphics or a combination of these and is designed with an estimated level of difficulty the support code for each takes the form of either c or mathematica and is included in the appendix and on the bundled diskette the algorithms are clearly laid out within the projects such that the book may be used with other symbolic numerical and algebraic manipulation products

Numerical Methods in Scientific Computing:

2008-09-04

this work addresses the increasingly important role of numerical methods in science and engineering it combines traditional and well developed topics with other material such as interval arithmetic elementary functions operator series convergence acceleration and continued fractions

Scientific Computation

2009-11-05

using real life applications this graduate level textbook introduces different mathematical methods of scientific computation to solve minimization problems using examples ranging from locating an aircraft finding the best time to replace a computer analyzing developments on the stock market and constructing phylogenetic trees the textbook focuses on several methods including nonlinear least squares with confidence analysis singular value decomposition best basis dynamic programming linear programming and various optimization procedures each chapter solves several realistic problems introducing the modeling optimization techniques and simulation as required this allows readers to see how the methods are put to use making it easier to grasp the basic ideas there are also worked examples practical notes and background materials to help the reader understand the topics covered interactive exercises are available at cambridge org 9780521849890

Numerical Analysis and Scientific Computation

2004

this text is intended for a first course in numerical analysis taken by students majoring in mathematics engineering computer science and the sciences this text emphasizes the mathematical ideas behind the methods and the idea of mixing methods for robustness the optional use of matlab is incorporated throughout the text

A Gentle Introduction to Scientific Computing

2022-05-01

scientific computation has established itself as a stand alone area of knowledge at the borderline between computer science and applied mathematics nonetheless its interdisciplinary character cannot be denied its methodologies are increasingly used in a wide variety of branches of science and engineering a gentle introduction to scientific computing intends to serve a very broad audience of college students across a variety of disciplines it aims to expose its readers to some of the basic tools and techniques used in computational science with a view to helping them understand what happens behind the scenes when simple tools such as solving equations plotting and interpolation are used to make the book as practical as possible the authors explore their subject both from a theoretical mathematical perspective and from an implementation driven programming perspective features middle ground approach between theory and implementation suitable reading for a broad range of students in stem disciplines could be used as the primary text for a first course in scientific computing introduces mathematics majors without any prior computer science exposure to numerical methods all mathematical knowledge needed beyond calculus together with the most widely used calculus notation and concepts is introduced in the text to make it self contained

Guide to Scientific Computing

2001

this book introduces the reader to many of the problems of scientific computing and the wide variety of methods used for their solutions it discusses basic approaches and stimulates an appreciation of the need for numerical methods in solving different types of problems for each of the problems presented the author provides some mathematical justification and examples these serve as practical evidence and motivation for the reader to follow practical justification of the methods is provided through computer examples and exercises the book includes an introduction to matlab but the code used is not intended to exemplify sophisticated or robust pieces of software it is purely illustrative of the method under discussion

Scientific Computing

2018-11-14

this book differs from traditional numerical analysis texts in that it focuses on the motivation and ideas behind the algorithms presented rather than on detailed analyses of them it presents a broad overview of methods and software for solving mathematical problems arising in computational modeling and data analysis including proper problem formulation selection of effective solution algorithms and interpretation of results in the 20 years since its original publication the modern fundamental perspective of this book has aged well and it continues to be used in the classroom this classics edition has been updated to include pointers to python software and the chebfun package expansions on barycentric formulation for lagrange polynomial interpretation and stochastic methods and the availability of about 100 interactive educational modules that dynamically illustrate the concepts and algorithms in the book scientific computing an introductory survey second edition is intended as both a textbook and a reference for computationally oriented disciplines that need to solve mathematical problems

Introduction to High Performance Scientific Computing

2010

this is a textbook that teaches the bridging topics between numerical analysis parallel computing code performance large scale applications

An Introduction to Scientific Computing

2007-12-03

this book demonstrates scientific computing by presenting twelve computational projects in several disciplines including fluid mechanics thermal science computer aided design signal processing and more each follows typical steps of scientific computing from physical and mathematical description to numerical formulation and programming and critical discussion of results the text teaches practical methods not usually available in basic textbooks numerical checking of accuracy choice of boundary conditions effective solving of linear systems comparison to exact solutions and more the final section of each project contains the solutions to proposed exercises and guides the reader in using the matlab scripts available online

Scientific Computing

2015-05-19

scientific computing for scientists and engineers is designed to teach undergraduate students relevant numerical methods and required

fundamentals in scientific computing most problems in science and engineering require the solution of mathematical problems most of which can only be done on a computer accurately approximating those problems requires solving differential equations and linear systems with millions of unknowns and smart algorithms can be used on computers to reduce calculation times from years to minutes or even seconds this book explains how can we approximate these important mathematical processes how accurate are our approximations how efficient are our approximations scientific computing for scientists and engineers covers an introduction to a wide range of numerical methods for linear systems eigenvalue problems differential equations numerical integration and nonlinear problems scientific computing fundamentals like floating point representation of numbers and convergence analysis of accuracy and efficiency simple programming examples in matlab to illustrate the algorithms and to solve real life problems exercises to reinforce all topics

Numerical Analysis

2009

this book introduces students with diverse backgrounds to various types of mathematical analysis that are commonly needed in scientific computing the subject of numerical analysis is treated from a mathematical point of view offering a complete analysis of methods for scientific computing with appropriate motivations and careful proofs in an engaging and informal style the authors demonstrate that many computational procedures and intriguing questions of computer science arise from theorems and proofs algorithms are presented in pseudocode so that students can immediately write computer programs in standard languages or use interactive mathematical software packages this book occasionally touches upon more advanced topics that are not usually contained in standard textbooks at this level

Data-Driven Modeling & Scientific Computation

2013-08-08

the burgeoning field of data analysis is expanding at an incredible pace due to the proliferation of data collection in almost every area of science the enormous data sets now routinely encountered in the sciences provide an incentive to develop mathematical techniques and computational algorithms that help synthesize interpret and give meaning to the data in the context of its scientific setting a specific aim of this book is to integrate standard scientific computing methods with data analysis by doing so it brings together in a self consistent fashion the key ideas from statistics time frequency analysis and low dimensional reductions the blend of these ideas provides meaningful insight into the data sets one is faced with in every scientific subject today including those generated from complex dynamical systems this is a particularly exciting field and much of the final part of the book is driven by intuitive examples from it showing how the three areas can be used in combination to give critical insight into the fundamental workings of various problems data driven modeling and scientific computation is a survey of practical numerical solution techniques for ordinary and partial differential equations as well as algorithms for data manipulation and analysis emphasis is on the implementation of numerical schemes to practical problems in the engineering biological and physical sciences an accessible introductory to advanced text this book fully integrates matlab and its

versatile and high level programming functionality while bringing together computational and data skills for both undergraduate and graduate students in scientific computing

Numerical Analysis in Modern Scientific Computing

2012-12-06

this book introduces the main topics of modern numerical analysis sequence of linear equations error analysis least squares nonlinear systems symmetric eigenvalue problems three term recursions interpolation and approximation large systems and numerical integrations the presentation draws on geometrical intuition wherever appropriate and is supported by a large number of illustrations exercises and examples

Scientific Computing

2018

this book explores the most significant computational methods and the history of their development it begins with the earliest mathematical numerical achievements made by the babylonians and the greeks followed by the period beginning in the 16th century for several centuries the main scientific challenge concerned the mechanics of planetary dynamics and the book describes the basic numerical methods of that time in turn at the end of the second world war scientific computing took a giant step forward with the advent of electronic computers which greatly accelerated the development of numerical methods as a result scientific computing became established as a third scientific method in addition to the two traditional branches theory and experimentation the book traces numerical methods journey back to their origins and to the people who invented them while also briefly examining the development of electronic computers over the years featuring 163 references and more than 100 figures many of them portraits or photos of key historical figures the book provides a unique historical perspective on the general field of scientific computing making it a valuable resource for all students and professionals interested in the history of numerical analysis and computing and for a broader readership alike

A First Course in Scientific Computing

2011-10-30

this book offers a new approach to introductory scientific computing it aims to make students comfortable using computers to do science to provide them with the computational tools and knowledge they need throughout their college careers and into their professional careers and to show how all the pieces can work together rubin landau introduces the requisite mathematics and computer science in the course of realistic problems from energy use to the building of skyscrapers to projectile motion with drag he is attentive to how each discipline uses its own language to describe the same concepts and how computations are concrete instances of the abstract landau covers the basics of

computation numerical analysis and programming from a computational science perspective the first part of the printed book uses the problem solving environment maple as its context with the same material covered on the accompanying cd as both maple and mathematica programs the second part uses the compiled language java with equivalent materials in fortran90 on the cd and the final part presents an introduction to latex replete with sample files providing the essentials of computing with practical examples a first course in scientific computing adheres to the principle that science and engineering students learn computation best while sitting in front of a computer book in hand in trial and error mode not only is it an invaluable learning text and an essential reference for students of mathematics engineering physics and other sciences but it is also a consummate model for future textbooks in computational science and engineering courses a broad spectrum of computing tools and examples that can be used throughout an academic career practical computing aimed at solving realistic problems both symbolic and numerical computations a multidisciplinary approach science math computer science maple and java in the book itself mathematica fortran90 maple and java on the accompanying cd in an interactive workbook format

Introduction to Scientific Computing and Data Analysis

2023-07-11

this textbook provides an introduction to numerical computing and its applications in science and engineering the topics covered include those usually found in an introductory course as well as those that arise in data analysis this includes optimization and regression based methods using a singular value decomposition the emphasis is on problem solving and there are numerous exercises throughout the text concerning applications in engineering and science the essential role of the mathematical theory underlying the methods is also considered both for understanding how the method works as well as how the error in the computation depends on the method being used the codes used for most of the computational examples in the text are available on github this new edition includes material necessary for an upper division course in computational linear algebra

A New Approach to Scientific Computation

2014-05-12

a new approach to scientific computation is a collection of papers delivered at a symposium held at the ibm thomas j watson research center on august 3 1982 the symposium provided a forum for reviewing various aspects of an approach to scientific computation based on a systematic theory of computer arithmetic computer demonstration packages for standard problems of numerical mathematics are considered comprised of 12 chapters this volume begins by summarizing an extensive research activity in scientific computation as well as the experience gained through various implementations of a new approach to arithmetic on diverse processors including even microprocessors a complete listing of the spaces that occur in numerical computations is presented followed by a discussion of aspects of traditional computer arithmetic and a new definition of computer arithmetic the properties of semimorphisms are also considered subsequent chapters focus on potential applications of programming packages to standard problems in numerical analysis implemented on a z80 based minicomputer

with a pascal extension called pascal sc as the programming language methods for solving algebraic problems with high accuracy and the use of a computer with floating point arithmetic to obtain guaranteed sharp bounds for the value of an arithmetic expression an extension of fortran which satisfies contemporary requirements of numerical computation is also described this book will be helpful to students and practitioners in the fields of computer science and applied mathematics

Scientific Computing with Python

2021-07-30

leverage this example packed comprehensive guide for all your python computational needs key featureslearn the first steps within python to highly specialized conceptsexplore examples and code snippets taken from typical programming situations within scientific computing delve into essential computer science concepts like iterating object oriented programming testing and mpi presented in strong connection to applications within scientific computing book description python has tremendous potential within the scientific computing domain this updated edition of scientific computing with python features new chapters on graphical user interfaces efficient data processing and parallel computing to help you perform mathematical and scientific computing efficiently using python this book will help you to explore new python syntax features and create different models using scientific computing principles the book presents python alongside mathematical applications and demonstrates how to apply python concepts in computing with the help of examples involving python 3 8 you ll use pandas for basic data analysis to understand the modern needs of scientific computing and cover data module improvements and built in features you ll also explore numerical computation modules such as numpy and scipy which enable fast access to highly efficient numerical algorithms by learning to use the plotting module matplotlib you will be able to represent your computational results in talks and publications a special chapter is devoted to sympy a tool for bridging symbolic and numerical computations by the end of this python book you ll have gained a solid understanding of task automation and how to implement and test mathematical algorithms within the realm of scientific computing what you will learnunderstand the building blocks of computational mathematics linear algebra and related python objectsuse matplotlib to create high quality figures and graphics to draw and visualize resultsapply object oriented programming oop to scientific computing in pythondiscover how to use pandas to enter the world of data processinghandle exceptions for writing reliable and usable codecover manual and automatic aspects of testing for scientific programmingget to grips with parallel computing to increase computation speedwho this book is for this book is for students with a mathematical background university teachers designing modern courses in programming data scientists researchers developers and anyone who wants to perform scientific computation in python

Scientific Computation with Automatic Result Verification

2012-12-06

scientific computation with result verification has been a persevering research topic at the institute for applied mathematics of karlsruhe university for many years a good number of meetings have been devoted to this area the latest of these meetings was held from 30 september

to 2 october 1987 in karlsruhe it was co sponsored by the gamm committee on computer arithmetic and scientific computation this volume combines edited versions of selected papers presented at this confer ence including a few which were presented at a similar meeting one year earlier the selection was made on the basis of relevance to the topic chosen for this volume all papers are original contributions in an appendix we have supplied a short account of the fortran sc language which permits the programming of algorithms with result verification in a natural manner the editors hope that the publication of this material as a supplementum of computing will further stimulate the interest of the scientific community in this important tool for scientific computation in particular we would like to make application scientists aware of its potential the papers in the second chapter of this volume should convince them that automatic result verification may help them to design more reliable software for their particular tasks we wish to thank all contributors for adapting their manuscripts to the goals of this volume we are also grateful to the publisher springer verlag of vienna for an efficient and quick production

Accuracy and Reliability in Scientific Computing

2005-01-01

numerical software is used to test scientific theories design airplanes and bridges operate manufacturing lines control power plants and refineries analyze financial derivatives identify genomes and provide the understanding necessary to derive and analyze cancer treatments because of the high stakes involved it is essential that results computed using software be accurate reliable and robust unfortunately developing accurate and reliable scientific software is notoriously difficult this book investigates some of the difficulties related to scientific computing and provides insight into how to overcome them and obtain dependable results the tools to assess existing scientific applications are described and a variety of techniques that can improve the accuracy and reliability of newly developed applications is discussed accuracy and reliability in scientific computing can be considered a handbook for improving the quality of scientific computing it will help computer scientists address the problems that affect software in general as well as the particular challenges of numerical computation approximations occurring at all levels continuous functions replaced by discretized versions infinite processes replaced by finite ones and real numbers replaced by finite precision numbers divided into three parts it starts by illustrating some of the difficulties in producing robust and reliable scientific software well known cases of failure are reviewed and the what and why of numerical computations are considered the second section describes diagnostic tools that can be used to assess the accuracy and reliability of existing scientific applications in the last section the authors describe a variety of techniques that can be employed to improve the accuracy and reliability of newly developed scientific applications the authors of the individual chapters are international experts many of them members of the ifip working group on numerical software

Introduction to Scientific Computing

2000

unique in content and approach this book covers all the topics that are usually covered in an introduction to scientific computing but folds in graphics and matrix vector manipulation in a way that gets readers to appreciate the connection between continuous mathematics and computing matlab 5 is used throughout to encourage experimentation and each chapter focuses on a different important theorem allowing readers to appreciate the rigorous side of scientific computing in addition to standard topical coverage each chapter includes 1 a sketch of a hard problem that involves ill conditioning high dimension etc 2 at least one theorem with both a rigorous proof and a proof by matlab experiment to bolster intuition 3 at least one recursive algorithm and 4 at least one connection to a real world application the book revolves around examples that are packaged in 200 m files which collectively communicate all the key mathematical ideas and an appreciation for the subtleties of numerical computing power tools of the trade polynomial interpolation piecewise polynomial interpolation numerical integration matrix computations linear systems the qr and cholesky factorizations nonlinear equations and optimization the initial value problem for engineers and mathematicians

Scientific Computation on Mathematical Problems and Conjectures

1990-01-01

this book studies the use of scientific computation as a tool in attacking a number of mathematical problems and conjectures in this case scientific computation refers primarily to computations that are carried out with a large number of significant digits for calculations associated with a variety of numerical techniques such as the second remez algorithm in polynomial and rational approximation theory richardson extrapolation of sequences of numbers the accurate finding of zeros of polynomials of large degree and the numerical approximation of integrals by quadrature techniques the goal of this book is not to delve into the specialized field dealing with the creation of robust and reliable software needed to implement these high precision calculations but rather to emphasize the enormous power that existing software brings to the mathematician s arsenal of weapons for attacking mathematical problems and conjectures

Scientific Computing with MATLAB

2018-09-03

scientific computing with matlab second edition improves students ability to tackle mathematical problems it helps students understand the mathematical background and find reliable and accurate solutions to mathematical problems with the use of matlab avoiding the tedious and complex technical details of mathematics this edition retains the structure of its predecessor while expanding and updating the content of each chapter the book bridges the gap between problems and solutions through well grouped topics and clear matlab example scripts and reproducible matlab generated plots students can effortlessly experiment with the scripts for a deep hands on exploration each chapter also includes a set of problems to strengthen understanding of the material

Elements of Scientific Computing

2010

part i describes the digital computer in terms of technology and systems design concepts chapters 1 and 2 provide certain background information necessary to understand and recognize the characteristics of a computing system designed to solve scientific computing problems and they also define the role of the digital computer as a modern problem solving tool chapter 3 comprises material helpful for a clear understanding of the remaining chapters especially those m part iii and it is presented principally for the sake of definitions and uniform terminology the material on operating systems has been included since students who have had an introduction to programming may not necessarily have an understanding of operating systems monitor programs and such related concepts as input output control throughout turnaround time and operating efficiency this chapter also deals with properties and characteristics of high level programming languages suitable for scientific problem solving it is assumed that the reader already knows one of these languages and is familiar with its syntax and external specifications the intent is to enhance and complement this basic information rather than to teach how to design an artificial language or construct a compiler an abridged version of part 1 was taught to students ranging in level from second year undergraduates in engineering and science and third and fourth year undergraduates in applied mathematics to graduate students in engineering

Introduction to Scientific Computing

1971

a book that emphasizes the importance of solving differential equations on a computer which comprises a large part of what has come to be called scientific computing an introductory chapter on this topic gives an overview of modern scientific computing outlining its applications and placing the subject in a larger context

Scientific Computing and Differential Equations

1992

this non traditional introduction to the mathematics of scientific computation describes the principles behind the major methods from statistics applied mathematics scientific visualization and elsewhere in a way that is accessible to a large part of the scientific community introductory material includes computational basics a review of coo

Mathematical Principles for Scientific Computing and Visualization

2008-10-21

do you want easy access to the latest methods in scientific computing this greatly expanded third edition of numerical recipes has it with wider coverage than ever before many new expanded and updated sections and two completely new chapters the executable c code now printed in colour for easy reading adopts an object oriented style particularly suited to scientific applications co authored by four leading scientists from academia and industry numerical recipes starts with basic mathematics and computer science and proceeds to complete working routines the whole book is presented in the informal easy to read style that made earlier editions so popular highlights of the new material include a new chapter on classification and inference gaussian mixture models hmms hierarchical clustering and svms a new chapter on computational geometry covering kd trees quad and octrees delaunay triangulation and algorithms for lines polygons triangles and spheres interior point methods for linear programming mcmc an expanded treatment of odes with completely new routines and many new statistical distributions for support or to subscribe to an online version please visit nr com

Numerical Recipes 3rd Edition

2007-09-06

cd rom includes mathematica files ode m and 11 notebooks chapter1 nb chapter10 nb and package nb

Scientific Computing with Mathematica®

2001-08-09

based on a course developed by the author introduction to high performance scientific computing introduces methods for adding parallelism to numerical methods for solving differential equations it contains exercises and programming projects that facilitate learning as well as examples and discussions based on the c programming language with additional comments for those already familiar with c the text provides an overview of concepts and algorithmic techniques for modern scientific computing and is divided into six self contained parts that can be assembled in any order to create an introductory course using available computer hardware part i introduces the c programming language for those not already familiar with programming in a compiled language part ii describes parallelism on shared memory architectures using openmp part iii details parallelism on computer clusters using mpi for coordinating a computation part iv demonstrates the use of graphical programming units gpus to solve problems using the cuda language for nvidia graphics cards part v addresses programming on gpus for non nvidia graphics cards using the opencl framework finally part vi contains a brief discussion of numerical methods and applications giving the reader an opportunity to test the methods on typical computing problems

Introduction to High Performance Scientific Computing

2019-03-01

the book of nature is written in the language of mathematics galileo galilei how is it possible to predict weather patterns for tomorrow with access solely to today s weather data and how is it possible to predict the aerodynamic behavior of an aircraft that has yet to be built the answer is computer simulations based on mathematical models sets of equations that describe the underlying physical properties however these equations are usually much too complicated to solve either by the smartest mathematician or the largest supercomputer this problem is overcome by constructing an approximation a numerical model with a simpler structure can be translated into a program that tells the computer how to carry out the simulation this book conveys the fundamentals of mathematical models numerical methods and algorithms opening with a tutorial on mathematical models and analysis it proceeds to introduce the most important classes of numerical methods with finite element finite difference and spectral methods as central tools the concluding section describes applications in physics and engineering including wave propagation heat conduction and fluid dynamics also covered are the principles of computers and programming including matlab

Numerical Methods in Scientific Computing

2008

this book provides a theoretical background in computation to scientists who use computational methods it explains how computing is used in the natural sciences and provides a high level overview of those aspects of computer science and software engineering that are most relevant for computational science the focus is on concepts results and applications rather than on proofs and derivations the unique feature of this book is that it connects the dots between computational science the theory of computation and information and software engineering the book should help scientists to better understand how they use computers in their work and to better understand how computers work it is meant to compensate a bit for the general lack of any formal training in computer science and information theory readers will learn something they can use throughout their careers

Fundamentals of Scientific Computing

2011-06-11

designed for undergraduates an introduction to high performance scientific computing assumes a basic knowledge of numerical computation and proficiency in fortran or c programming and can be used in any science computer science applied mathematics or engineering department or by practicing scientists and engineers especially those associated with one of the national laboratories or supercomputer centers this text evolved from a new curriculum in scientific computing that was developed to teach undergraduate science and engineering majors how to use

high performance computing systems supercomputers in scientific and engineering applications designed for undergraduates an introduction to high performance scientific computing assumes a basic knowledge of numerical computation and proficiency in fortran or c programming and can be used in any science computer science applied mathematics or engineering department or by practicing scientists and engineers especially those associated with one of the national laboratories or supercomputer centers the authors begin with a survey of scientific computing and then provide a review of background numerical analysis ieee arithmetic unix fortran and tools elements of matlab idl avs next full coverage is given to scientific visualization and to the architectures scientific workstations and vector and parallel supercomputers and performance evaluation needed to solve large scale problems the concluding section on applications includes three problems molecular dynamics advection and computerized tomography that illustrate the challenge of solving problems on a variety of computer architectures as well as the suitability of a particular architecture to solving a particular problem finally since this can only be a hands on course with extensive programming and experimentation with a variety of architectures and programming paradigms the authors have provided a laboratory manual and supporting software via anonymous ftp scientific and engineering computation series

Computation in Science

2015-12-01

this textbook is an introduction to scientific computing in which several numerical methods for the computer solution of certain classes of mathematical problems are illustrated the authors show how tonbsp compute the zeros or the integrals of continuous functions solve linear systems approximate functions by polynomials and construct accurate approximations for thenbsp solution of differential equations to make the presentation concrete and appealing the programming environmentnbsp matlab is adopted as a faithful companion all the algorithms introduced throughout the booknbsp are shown thus furnishing an immediate quantitative assessment of their theoretical properties such as stability accuracy and complexity the book also contains the solution to several problemsnbsp raised through exercises and examples oftennbsp originating from specific applications a specific section is devotednbsp to subjectsnbsp which were not addressed in the book andnbsp indicatenbsp the bibliographical references for a more comprehensive treatment of the material nbsp nbsp nbsp nbsp nbsp nbsp

An Introduction to High-performance Scientific Computing

1996

practical numerical and scientific computing with matlab and python concentrates on the practical aspects of numerical analysis and linear and non linear programming it discusses the methods for solving different types of mathematical problems using matlab and python although the book focuses on the approximation problem rather than on error analysis of mathematical problems it provides practical ways to calculate errors the book is divided into three parts covering topics in numerical linear algebra methods of interpolation numerical differentiation and integration solutions of differential equations linear and non linear programming problems and optimal control problems this book has the following advantages it adopts the programming languages matlab and python which are widely used among academics

scientists and engineers for ease of use and contain many libraries covering many scientific and engineering fields it contains topics that are rarely found in other numerical analysis books such as ill conditioned linear systems and methods of regularization to stabilize their solutions nonstandard finite differences methods for solutions of ordinary differential equations and the computations of the optimal controls it provides a practical explanation of how to apply these topics using matlab and python it discusses software libraries to solve mathematical problems such as software gekko pulp and pyomo these libraries use python for solutions to differential equations and static and dynamic optimization problems most programs in the book can be applied in versions prior to matlab 2017b and python 3 7 4 without the need to modify these programs this book is aimed at newcomers and middle level students as well as members of the scientific community who are interested in solving math problems using matlab or python

Scientific Computing with MATLAB

2003

this introduction to scientific computing illustrates several numerical methods for the computer solution of certain classes of mathematical problems the authors show how to compute the zeros or the integrals of continuous functions solve linear systems approximate functions by polynomials and construct accurate approximations for the solution of differential equations to make the presentation concrete the programming environment matlab is adopted as a faithful companion

Practical Numerical and Scientific Computing with MATLAB® and Python

2020-03-18

from the reviews an excellent reference on undergraduate mathematical computing american mathematical monthly manuals for such systems maple and matlab tend to use trivial examples making it difficult for new users of such systems to quickly apply their power to real problems the authors have written a good book to address this need the book is worth buying if you want guidance in applying maple and matlab to problems in the workplace computing reviews the presentation is unique and extremely interesting i was thrilled to read this text and to learn the powerful problem solving skills presented by these authors i recommend the text highly as a learning experience not only to engineering students but also to anyone interested in computation mathematics of computation

Scientific Computing with MATLAB and Octave

2006-08-23

this book concerns programming techniques like object oriented programming and generic template programming these modern techniques have proven to increase flexibility modularization code reuse and improve maintenance of large numerical codes the book contains 11 refereed and

comprehensive chapters on major subjects in computational science and engineering quality measurement of numerical software high performance numerical computations with c without sacrificing efficiency a balanced discussion of java in scientific computing object oriented design of direct sparse solvers geometric kernels in geographical information systems and tools for error estimation in finite element methods tools for validating computational results and how to simplify the implementation of highly complex mathematical model for material processing

Solving Problems in Scientific Computing Using Maple and MATLAB®

2012-12-06

modern development of science and technology is based to a large degree on computer modelling to understand the principles and techniques of computer modelling students should first get a strong background in classical numerical methods which are the subject of this book this text is intended for use in a numerical methods course for engineering and science students but will also be useful as a handbook on numerical techniques for research students essentials of scientific computing is as self contained as possible and considers a variety of methods for each type of problem discussed it covers the basic ideas of numerical techniques including iterative process extrapolation and matrix factorization and practical implementation of the methods shown is explained through numerous examples an introduction to matlab is included together with a brief overview of modern software widely used in scientific computations outlines classical numerical methods which is essential for understanding the principles and techniques of computer modelling intended for use in a numerical methods course for engineering and science students but will also be useful as a handbook on numerical techniques for research students covers the basic ideas of numerical techniques including iterative process extrapolation and matrix factorization

Advances in Software Tools for Scientific Computing

2000

Essentials of Scientific Computing

2008-03-01

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