Ebook free Introduction to scientific computing a matrix vector approach using matlab Full PDF

Introduction to Scientific Computing Projects in Scientific Computation Scientific Computing Guide to Scientific Computing Scientific Computing Introduction to High Performance Scientific Computing Scientific Computing with Automatic Result Verification Scientific Computing Introduction to Scientific and Technical Computing Numerical Analysis Introduction to Scientific Computing Elements of Scientific Computing A Gentle Introduction to Scientific Computing Introduction to High Performance Scientific Computing A First Course in Scientific Computing Numerical Methods in Scientific Computing Essentials of Scientific Computing An Introduction to High-performance Scientific Computing Modern Software Tools for Scientific Computing Accuracy and Reliability in Scientific Computing An Introduction to Scientific Computing Elements of Scientific Computing Scientific Computing in Electrical Engineering Modern Methods in Scientific Computing and Applications Scientific Computing An Introduction to Bayesian Scientific Computing Scientific Computing and Differential Equations Combinatorial Scientific Computing Applied Parallel Computing Principles of Parallel Scientific Computing Scientific Computing with MATLAB Introduction to Scientific Computing and Data Analysis Numerical Methods for Scientific Computing Scientific Computing with Python Scientific Computing with MATLAB Numerical Methods in Scientific Computing Computer Algebra in Scientific Computing Advances in Software Tools for Scientific Computing Scientific Computing with Scala Scientific Computing with Mathematica®

Introduction to Scientific Computing

1971

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

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

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

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

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

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

Scientific Computing with Automatic Result Verification

1992-12-03

scientific computing with automatic result verification

Scientific Computing

2023-04-03

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

Introduction to Scientific and Technical Computing

2016-08-19

created to help scientists and engineers write computer code this practical book addresses the important tools and techniques that are necessary for scientific computing but which are not yet commonplace in science and engineering curricula this book contains chapters summarizing the most important topics that computational researchers need to know about it leverages the viewpoints of passionate experts involved with scientific computing courses around the globe and aims to be a starting point for new computational scientists and a reference for the experienced each contributed chapter focuses on a specific tool or skill providing the content needed to provide a working knowledge of the topic in about one day while many individual books on specific computing topics exist none is explicitly focused on getting technical professionals and students up and running immediately across a variety of computational areas

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

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

Elements of Scientific Computing

2010-09-27

science used to be experiments and theory now it is experiments theory and computations the computational approach to understanding nature and technology is currently flowering in many fields such as physics geophysics astrophysics chemistry biology and most engineering disciplines this book is a gentle introduction to such computational methods where the techniques are explained through examples it is our goal to teach principles and ideas that carry over from field to field you will learn basic methods and how to implement them in order to gain the most from this text you will need prior knowledge of calculus basic linear algebra and elementary programming

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

Introduction to High Performance Scientific Computing

2019-03-01

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

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

Numerical Methods in Scientific Computing

2008-01-01

this new book from the authors of the classic book numerical methods addresses the increasingly important role of numerical methods in science and engineering more cohesive and comprehensive than any other modern textbook in the field it combines traditional and well developed topics with other material that is rarely found in numerical analysis texts such as interval arithmetic elementary functions operator series convergence acceleration and continued fractions although this volume is self contained more comprehensive treatments of matrix computations will be given in a forthcoming volume a supplementary website contains three appendices an introduction to matrix computations a description of mulprec a matlab multiple precision package and a guide to literature algorithms and software in numerical analysis review questions problems and computer exercises are also included for use in an introductory graduate course in numerical analysis and for researchers who use numerical methods in science and engineering

Essentials of Scientific Computing

2000

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

An Introduction to High-performance Scientific Computing

1996

looking back at the years that have passed since the realization of the very first electronic multi purpose computers one observes a tremendous growth in hardware and software performance today researchers and engi neers have access to computing power and software that can solve numerical problems which are not fully understood in terms of existing mathemati cal theory thus computational sciences must in many respects be viewed as experimental disciplines as a consequence there is a demand for high quality flexible software that allows and even encourages experimentation with alternative numerical strategies and mathematical models extensibil ity is then a key issue the software must provide an efficient environment for incorporation of new methods and models that will be required in fu ture problem scenarios the development of such kind of flexible software is a challenging and expensive task one way to achieve these goals is to in vest much work in the design and implementation of generic software tools which can be used in a wide range of application fields in order to provide a forum where researchers could present and discuss their contributions to the described development an international work shop on modern software tools for scientific computing was arranged in oslo norway september 16 18 1996 this workshop informally referred to as sci tools 96 was a collaboration between sintef applied mathe matics and the departments of informatics and mathematics at the uni versity of oslo

Modern Software Tools for Scientific Computing

2012-12-06

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

Accuracy and Reliability in Scientific Computing

2005-01-01

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

An Introduction to Scientific Computing

2007-12-03

this book is a collection of papers presented at the last scientific computing in electrical engineering scee conference held in sicily in 2004 the series of scee conferences aims at addressing mathematical problems which have a relevancy to industry the areas covered at scee 2004 were electromagnetism circuit simulation coupled problems and general mathematical and computational methods

Elements of Scientific Computing

2010

when we first heard in the spring of 2000 that the seminaire de matmmatiques superieures sms was interested in devoting its session of the summer of 200l its 40th to scientific computing the idea of taking on the organizational work seemed to us somewhat remote more immediate things were on our minds one of us was about to go on leave to the courant institute the other preparing for a research summer in paris but the more we learned about the possibilities of such a seminar the support for the organization and also the great history of the sms the more we grew attached to the project the topics we planned to cover were intended to span a wide range of theoretical and practical tools for solving problems in image processing thin films mathematical finance electrical engineering moving interfaces and combustion these applications alone show how wide the influence of scientific computing has become over the last two decades almost any area of science and engineering is greatly influenced by simulations and the sms workshop in this field came very timely we decided to organize the workshop in pairs of speakers for each of the eight topics we had chosen and we invited the leading experts worldwide in these fields we were very fortunate that every speaker we invited accepted to come so the program could be realized as planned

Scientific Computing in Electrical Engineering

2007-01-10

this text introduces the basic concepts of parallel and vector computing in the context of an introduction to numerical methods it has chapters on parallel and vector matrix multiplication and solution of linear systems by direct and iterative methods it should be suitable for advanced undergraduate and beginning graduate courses in computer science applied mathematics and engineering ideally students will have access to a parallel or vector computer but the material can be studied profitably in any case

Modern Methods in Scientific Computing and Applications

2002-09-30

this book has been written for undergraduate and graduate students in various disciplines of mathematics the authors internationally recognized experts in their field have developed a superior teaching and learning tool that makes it easy to grasp new concepts and apply them in practice the book s highly accessible approach makes it particularly ideal if you want to become acquainted with the bayesian approach to computational science but do not need to be fully immersed in detailed statistical analysis

Scientific Computing

1993

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

An Introduction to Bayesian Scientific Computing

2007-11-20

combinatorial scientific computing explores the latest research on creating algorithms and software tools to solve key combinatorial problems on large scale high performance computing architectures it includes contributions from international researchers who are pioneers in designing software and applications for high performance computing systems

Scientific Computing and Differential Equations

1992

this book constitutes the refereed proceedings of the 7th international conference on applied parallel computing para 2004 held in june 2004 the 118 revised full papers presented together with five invited lectures and 15 contributed talks were carefully reviewed and selected for inclusion in the proceedings the papers are organized in topical sections

Combinatorial Scientific Computing

2012-01-25

new insight in many scientific and engineering fields is unthinkable without the use of numerical simulations running efficiently on modern computers the faster we get new results the bigger and accurate are the problems that we can solve it is the combination of mathematical ideas plus efficient programming that drives the progress in many disciplines future champions in the area thus will have to be qualified in their application domain they will need a profound understanding of some mathematical ideas and they need the skills to deliver fast code the present textbook targets students which have programming skills already and do not shy away from mathematics though they might be educated in computer science or an application domain it introduces the basic concepts and ideas behind applied mathematics and parallel programming that we need to write numerical simulations for today s multicore workstations our intention is not to dive into one particular application domain or to introduce a new programming language we lay the generic foundations for future courses and projects in the area the text is written in an accessible style which is easy to digest for students without years and years of mathematics education it values clarity and intuition over formalism and uses a simple n body simulation setup to illustrate basic ideas that are of relevance in various different subdomains of scientific computing its primary goal is to make theoretical and paradigmatic ideas accessible to undergraduate students and to bring the fascination of the field across

Applied Parallel Computing

2006-02-27

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

Principles of Parallel Scientific Computing

2022-02-10

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

Scientific Computing with MATLAB

2018-09-03

a comprehensive guide to the theory intuition and application of numerical methods in linear algebra analysis and differential equations with extensive commentary and code for three essential scientific computing languages julia python and matlab

Introduction to Scientific Computing and Data Analysis

2023-07-11

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

Numerical Methods for Scientific Computing

2022-03-13

although scientific computing is very often associated with numeric computations the use of computer algebra methods in scientific computing has obtained considerable attention in the last two decades computer algebra methods are especially suitable for parametric analysis of the key properties of systems arising in scientific computing the expression based computational answers generally provided by these methods are very appealing as they directly relate properties to parameters and speed up testing and tuning of mathematical models through all their possible behaviors this book contains 8 original research articles dealing with a broad range of topics ranging from algorithms data structures and implementation techniques for high performance sparse multivariate polynomial arithmetic over the integers and rational numbers over methods for certifying the isolated zeros of polynomial systems to computer algebra problems in quantum computing

Scientific Computing with Python

2021-07-30

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

Scientific Computing with MATLAB

2004-06-24

learn to solve scientific computing problems using scala and its numerical computing data processing concurrency and plotting libraries about this book parallelize your numerical computing code using convenient and safe techniques accomplish common high performance scientific computing goals in scala learn about data visualization and how to create high quality scientific plots in scala who this book is for scientists and engineers who would like to use scala for their scientific and numerical computing needs a basic familiarity with undergraduate level mathematics and statistics is expected but not strictly required a basic knowledge of scala is required as well as the ability to write simple scala programs however complicated programming concepts are not used in the book anyone who wants to explore using scala for writing scientific or engineering software will benefit from the book what you will learn write and read a variety of popular file formats used to store scientific data use breeze for linear algebra optimization and digital signal processing gain insight into saddle for data analysis use scalalab for interactive computing quickly and conveniently write safe parallel applications using scala s parallel collections implement and deploy concurrent programs using the akka framework use the wisp plotting library to produce scientific plots visualize multivariate data using various visualization techniques in detail scala is a statically typed java virtual machine jvm based language with strong support for functional programming there exist libraries for scala that cover a range of common scientific computing tasks from linear algebra and numerical algorithms to convenient and safe parallelization to powerful plotting facilities learning to use these to perform common scientific tasks will allow you to write programs that are both fast and easy to write and maintain we will start by discussing the advantages of using scala over other scientific computing platforms you will discover scala packages that provide the functionality you have come to expect when writing scientific software we will explore using scala s breeze library for linear algebra optimization and signal processing we will then proceed to the saddle library for data analysis if you have experience in r or with python s popular pandas library you will learn how to translate those skills to saddle if you are new to data analysis you will learn basic concepts of saddle as well well will explore the numerical computing environment called scalalab it comes bundled with a lot of scientific software readily available we will use it for interactive computing data analysis and visualization in the following chapters we will explore using scala s powerful parallel collections for safe and convenient parallel programming topics such as the akka concurrency framework will be covered finally you will learn about multivariate data visualization and how to produce professional looking plots in scala easily after reading the book you should have more than enough information on how to start using scala as your scientific computing platform style and approach examples are provided on how to use scala to do basic numerical and scientific computing tasks all the concepts are illustrated with more involved examples in each chapter the goal of the book is to allow you to translate existing experience in scientific computing to scala

Numerical Methods in Scientific Computing

2008

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

Computer Algebra in Scientific Computing

2019-11-04

Advances in Software Tools for Scientific Computing

2000

Scientific Computing with Scala

2016-04-27

Scientific Computing with Mathematica®

2001-08-09

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