Computational Science And Its Applications Iccsa 2006 International Conference Glasgow Uk May 8 11 2006 Proceedings Part Iii Lecture Notes In Computer Science

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Fourier Modal Method and Its Applications in Computational Nanophotonics

Industrial Applications of High-Performance Computing: Best Global Practices offers a global overview of high-performance computing (HPC) for industrial applications, along with a discussion of software challenges, business models, access models (e.g., cloud computing), public-private partnerships, simulation and modeling, visualization, big data analysis, and governmental and industrial influence. Featuring the contributions of leading experts from 11 different countries, this authoritative book: Provides a brief history of the development of the supercomputer Describes the supercomputing environments of various government entities in terms of policy and service models Includes a case study section that addresses more subtle and technical aspects of industrial

supercomputing Shows how access to supercomputing matters, and how supercomputing can be used to solve large-scale and complex science and engineering problems Emphasizes the need for collaboration between companies, political organizations, government agencies, and entire nations Industrial Applications of High-Performance Computing: Best Global Practices supplies computer engineers and researchers with a state-of-the-art supercomputing reference. This book also keeps policymakers and industrial decision-makers informed about the economic impact of these powerful technological investments.

Computational Science and Its Applications - ICCSA 2006

The six volumes LNCS 11619-11624 constitute the refereed proceedings of the 19th International Conference on Computational Science and Its Applications, ICCSA 2019, held in Saint Petersburg, Russia, in July 2019. The 64 full papers, 10 short papers and 259 workshop papers presented were carefully reviewed and selected form numerous submissions. The 64 full papers are organized in the following five general tracks: computational methods, algorithms and scientific applications; high performance computing and networks; geometric modeling, graphics and visualization; advanced and emerging applications; and information systems and technologies. The 259 workshop papers were presented at 33 workshops in various areas of computational sciences, ranging from computational science technologies to specific areas of computational sciences, such as software engineering, security, artificial intelligence and blockchain technologies.

Computational Electromagnetics and Its Applications

The book serves as a first introduction to computer programming of scientific applications, using the high-level Python language. The exposition is example and problem-oriented, where the applications are taken from mathematics, numerical calculus, statistics, physics, biology and finance. The book teaches "Matlab-style" and procedural programming as well as object-oriented programming. High school mathematics is a required background and it is advantageous to study classical and numerical one-variable calculus in parallel with reading this book. Besides learning how to program computers, the reader will also learn how to solve mathematical problems, arising in various branches of science and engineering, with the aid of numerical methods and programming. By blending programming, mathematics and scientific applications, the book lays a solid foundation for practicing computational science. From the reviews: Langtangen does an excellent job of introducing programming as a set of skills in problem solving. He guides the reader into thinking properly about producing program logic and data structures for modeling real-world problems using objects and functions and embracing the object-oriented paradigm. Summing Up: Highly recommended. F. H. Wild III, Choice, Vol. 47 (8), April 2010 Those of us who have learned scientific programming in Python ‘on the streets’ could be a little jealous of students who have the opportunity to take a course out of Langtangen’s Primer.” John D. Cook, The Mathematical Association of America, September 2011 This book goes through Python in particular, and programming in general, via tasks that scientists will likely perform. It contains valuable information for students new to scientific computing and would be the perfect bridge between an introduction to programming and an advanced course on numerical methods or computational

science. Alex Small, IEEE, CiSE Vol. 14 (2), March /April 2012 “This fourth edition is a wonderful, inclusive textbook that covers pretty much everything one needs to know to go from zero to fairly sophisticated scientific programming in Python” Joan Horvath, Computing Reviews, March 2015

Computational Science and Its Applications - ICCSA 2010

This volume brings together selected contributed papers presented at the International Conference of Computational Methods in Science and Engineering (ICCMSE 2006), held in Chania, Greece, October 2006. The conference aims to bring together computational scientists from several disciplines in order to share methods and ideas. The ICCMSE is unique in its kind. It regroups original contributions from all fields of the traditional Sciences, Mathematics, Physics, Chemistry, Biology, Medicine and all branches of Engineering. It would be perhaps more appropriate to define the ICCMSE as a conference on computational science and its applications to science and engineering. Topics of general interest are: Computational Mathematics, Theoretical Physics and Theoretical Chemistry. Computational Engineering and Mechanics, Computational Biology and Medicine, Computational Geosciences and Meteorology, Computational Economics and Finance, Scientific Computation. High Performance Computing, Parallel and Distributed Computing, Visualization, Problem Solving Environments, Numerical Algorithms, Modelling and Simulation of Complex System, Web-based Simulation and Computing, Grid-based Simulation and Computing, Fuzzy Logic, Hybrid Computational Methods, Data Mining, Information Retrieval and Virtual Reality, Reliable Computing, Image Processing, Computational Science and Education etc. More than 800 extended abstracts have been submitted for consideration for presentation in ICCMSE 2005. From these 500 have been selected after international peer review by at least two independent reviewers.

Industrial Applications of High-Performance Computing

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. The book offers a state-of-the-art overview of the latest research, tool development, and applications. It focuses on load balancing and parallelization on high-performance computers, large-scale optimization, algorithmic differentiation of numerical simulation code, sparse matrix software tools, and combinatorial challenges and applications in large-scale social networks. The authors unify these seemingly disparate areas through a common set of abstractions and algorithms based on combinatorics, graphs, and hypergraphs. Combinatorial algorithms have long played a crucial enabling role in scientific and engineering computations and their importance continues to grow with the demands of new applications and advanced architectures. By addressing current challenges in the field, this volume sets the stage for the accelerated development and deployment of fundamental enabling technologies in high-performance scientific computing.

Computational Science and its Applications

The six-volume set LNCS 8579-8584 constitutes the refereed proceedings of the 14th International Conference on Computational Science and Its Applications, ICCSA 2014, held in Guimarães, Portugal, in June/July 2014. The 347 revised papers presented in 30 workshops and a special track were carefully reviewed and selected from 1167. The 289 papers presented in the workshops cover various areas in computational science ranging from computational science technologies to specific areas of computational science such as computational geometry and security.

Hybrid Computational Intelligence

This two-volume set is assembled following the 2008 International Conference on Computational Science and Its Applications, ICCSA 2008, a premium int- national event held in Perugia, Italy, from June 30 to July 3, 2008. The collection of fully refereed high-quality original works accepted as theme papers for presentation at ICCSA 2008 are published in this LNCS proceedings set. This outstanding collection complements the volume of workshop papers, traditionally published by IEEE Computer Society. The continuous support of computational science researchers has helped ICCSA to become a ?rmly established forum in the area of scienti?c computing and the conference itself become a recurring scienti?c and professional meeting that cannot be given up. The computational science ?eld, based on fundamental disciplines such as mathematics, physics, and chemistry, is ?nding new computational approaches to foster the human progress in heterogeneous and fundamental areas such as aerospace and automotive industries, bioinformatics and nanotechnology studies, networks and grid computing, computational geometry and biometrics, computer education, virtual reality, and art. Due to the growing complexity of many ch- lenges in computational science, the use of sophisticated algorithms and eme- ing technologies is inevitable. Together, these far-reaching scienti?c areas help to shape this conference in the areas of state-of-the-art computational science research and applications, encompassing the facilitating theoretical foundations and the innovative applications of such results in other areas.

Computational Science and Its Applications – ICCSA 2016

The five-volume set LNCS 9786-9790 constitutes the refereed proceedings of the 16th International Conference on Computational Science and Its Applications, ICCSA 2016, held in Beijing, China, in July 2016. The 239 revised full papers and 14 short papers presented at 33 workshops were carefully reviewed and selected from 849 submissions. They are organized in five thematical tracks: computational methods, algorithms and scientific applications; high performance computing and networks; geometric modeling, graphics and visualization; advanced and emerging applications; and information systems and technologies.

Computational Science and Its Applications – ICCSA 2020

The seven volumes LNCS 12249-12255 constitute the refereed proceedings of the

20th International Conference on Computational Science and Its Applications, ICCSA 2020, held in Cagliari, Italy, in July 2020. Due to COVID-19 pandemic the conference was organized in an online event. Computational Science is the main pillar of most of the present research, industrial and commercial applications, and plays a unique role in exploiting ICT innovative technologies. The 466 full papers and 32 short papers presented were carefully reviewed and selected from 1450 submissions. Apart from the general track, ICCSA 2020 also include 52 workshops, in various areas of computational sciences, ranging from computational science technologies, to specific areas of computational sciences, such as software engineering, security, machine learning and artificial intelligence, blockchain technologies, and of applications in many fields.

Computational Science and Its Applications - ICCSA 2006

The five-volume set LNCS 9786-9790 constitutes the refereed proceedingsof the 16th International Conference on Computational Science and ItsApplications, ICCSA 2016, held in Beijing, China, in July 2016. The 239 revised full papers and 14 short papers presented at 33 workshops were carefully reviewed and selected from 849 submissions. They are organized in five thematical tracks: computational methods, algorithms and scientific applications; high performance computing and networks; geometric modeling, graphics and visualization; advanced and emerging applications; and information systems and technologies.

Computational Science – ICCS 2020

Computational Intelligence and Its Applications in Healthcare presents rapidly growing applications of computational intelligence for healthcare systems, including intelligent synthetic characters, man-machine interface, menu generators, user acceptance analysis, pictures archiving, and communication systems. Computational intelligence is the study of the design of intelligent agents, which are systems that act intelligently: they do what they think are appropriate for their circumstances and goals; they're flexible to changing environments and goals; they learn from experience; and they make appropriate choices given perceptual limitations and finite computation. Computational intelligence paradigms offer many advantages in maintaining and enhancing the field of healthcare. Provides coverage of fuzzy logic, neural networks, evolutionary computation, learning theory, probabilistic methods, telemedicine, and robotics applications Includes coverage of artificial intelligence and biological applications, soft computing, image and signal processing, and genetic algorithms Presents the latest developments in computational methods in healthcare Bridges the gap between obsolete literature and current literature

Computational Intelligence for Movement Sciences: Neural Networks and Other Emerging Techniques

Computational Science and Its Applications - ICCSA 2014

The seven volumes LNCS 12249-12255 constitute the refereed proceedings of the

20th International Conference on Computational Science and Its Applications, ICCSA 2020, held in Cagliari, Italy, in July 2020. Due to COVID-19 pandemic the conference was organized in an online event. Computational Science is the main pillar of most of the present research, industrial and commercial applications, and plays a unique role in exploiting ICT innovative technologies. The 466 full papers and 32 short papers presented were carefully reviewed and selected from 1450 submissions. Apart from the general track, ICCSA 2020 also include 52 workshops, in various areas of computational sciences, ranging from computational science technologies, to specific areas of computational sciences, such as software engineering, security, machine learning and artificial intelligence, blockchain technologies, and of applications in many fields.

Proceeding of International Conference on Computational Science and Applications

Hybrid Computational Intelligence: Challenges and Utilities is a comprehensive resource that begins with the basics and main components of computational intelligence. It brings together many different aspects of the current research on HCI technologies, such as neural networks, support vector machines, fuzzy logic and evolutionary computation, while also covering a wide range of applications and implementation issues, from pattern recognition and system modeling, to intelligent control problems and biomedical applications. The book also explores the most widely used applications of hybrid computation as well as the history of their development. Each individual methodology provides hybrid systems with complementary reasoning and searching methods which allow the use of domain knowledge and empirical data to solve complex problems. Provides insights into the latest research trends in hybrid intelligent algorithms and architectures Focuses on the application of hybrid intelligent techniques for pattern mining and recognition, in big data analytics, and in human-computer interaction Features hybrid intelligent applications in biomedical engineering and healthcare informatics

Introduction to Computational Science

The six volumes LNCS 11619-11624 constitute the refereed proceedings of the 19th International Conference on Computational Science and Its Applications, ICCSA 2019, held in Saint Petersburg, Russia, in July 2019. The 64 full papers, 10 short papers and 259 workshop papers presented were carefully reviewed and selected form numerous submissions. The 64 full papers are organized in the following five general tracks: computational methods, algorithms and scientific applications; high performance computing and networks; geometric modeling, graphics and visualization; advanced and emerging applications; and information systems and technologies. The 259 workshop papers were presented at 33 workshops in various areas of computational sciences, ranging from computational science technologies to specific areas of computational sciences, such as software engineering, security, artificial intelligence and blockchain technologies.

Computational Science and Its Applications – ICCSA 2019

This four-volume set synthesizes the International Conference on Computational

Science and Its Applications, ICCSA 2010. Topics include computational methods, algorithms and scientific application, high performance computing and networks, and more.

A Primer on Scientific Programming with Python

The six-volume set LNCS 10404-10409 constitutes the refereed proceedings of the 17th International Conference on Computational Science and Its Applications, ICCSA 2017, held in Trieste, Italy, in July 2017. The 313 full papers and 12 short papers included in the 6-volume proceedings set were carefully reviewed and selected from 1052 submissions. Apart from the general tracks, ICCSA 2017 included 43 international workshops in various areas of computational sciences, ranging from computational science technologies to specific areas of computational sciences, such as computer graphics and virtual reality. Furthermore, this year ICCSA 2017 hosted the XIV International Workshop On Quantum Reactive Scattering. The program also featured 3 keynote speeches and 4 tutorials.

Computational Intelligence and Its Applications

The natural mission of Computational Science is to tackle all sorts of human problems and to work out intelligent automata aimed at alleviating the b- den of working out suitable tools for solving complex problems. For this reason ComputationalScience,thoughoriginatingfromtheneedtosolvethemostch- lenging problems in science and engineering (computational science is the key player in the ?ght to gain fundamental advances in astronomy, biology, che- stry, environmental science, physics and several other scienti?c and engineering disciplines) is increasingly turning its attention to all ?elds of human activity. In all activities, in fact, intensive computation, information handling, kn- ledge synthesis, the use of ad-hoc devices, etc. increasingly need to be exploited and coordinated regardless of the location of both the users and the (various and heterogeneous) computing platforms. As a result the key to understanding the explosive growth of this discipline lies in two adjectives that more and more appropriately refer to Computational Science and its applications: interoperable and ubiquitous. Numerous examples of ubiquitous and interoperable tools and applicationsaregiveninthepresentfourLNCSvolumescontainingthecontri- tions delivered at the 2004 International Conference on Computational Science and its Applications (ICCSA 2004) held in Assisi, Italy, May 14–17, 2004.

Computational Science and Its Applications -- ICCSA 2004

The five-volume set LNCS 3980-3984 constitutes the refereed proceedings of the International Conference on Computational Science and Its Applications, ICCSA 2006. The volumes present a total of 664 papers organized according to the five major conference themes: computational methods, algorithms and applications high performance technical computing and networks advanced and emerging applications geometric modelling, graphics and visualization information systems and information technologies. This is Part II.

Computational Science and Its Applications - ICCSA 2008

The six volumes LNCS 11619-11624 constitute the refereed proceedings of the 19th International Conference on Computational Science and Its Applications, ICCSA 2019, held in Saint Petersburg, Russia, in July 2019. The 64 full papers, 10 short papers and 259 workshop papers presented were carefully reviewed and selected form numerous submissions. The 64 full papers are organized in the following five general tracks: computational methods, algorithms and scientific applications; high performance computing and networks; geometric modeling, graphics and visualization; advanced and emerging applications; and information systems and technologies. The 259 workshop papers were presented at 33 workshops in various areas of computational sciences, ranging from computational science technologies to specific areas of computational sciences, such as software engineering, security, artificial intelligence and blockchain technologies.

Computational Science and Its Applications – ICCSA 2019

This book focuses on computational intelligence techniques and their applications — fast-growing and promising research topics that have drawn a great deal of attention from researchers over the years. It brings together many different aspects of the current research on intelligence technologies such as neural networks, support vector machines, fuzzy logic and evolutionary computation, and covers a wide range of applications from pattern recognition and system modeling, to intelligent control problems and biomedical applications. Fundamental concepts and essential analysis of various computational techniques are presented to offer a systematic and effective tool for better treatment of different applications, and simulation and experimental results are included to illustrate the design procedure and the effectiveness of the approaches. Sample Chapter(s) Chapter 1: Maximal Margin Algorithms for Pose Estimation (658 KB) Contents:Evolutionary Computation and Its Applications:Maximal Margin Algorithms for Pose Estimation (Ying Guo and Jiaming Li)Polynomial Modeling in a Dynamic Environment Based on a Particle Swarm Optimization (Kit Yan Chan and Tharam S Dillon)Restoration of Half-toned Color-quantized Images Using Particle Swarm Optimization with Multi-wavelet Mutation (Frank H F Leung, Benny C W Yeung and Y H Chan)Fuzzy Logics and Their Applications:Hypoglycemia Detection for Insulin-dependent Diabetes Mellitus: Evolved Fuzzy Inference System Approach (S H Ling, P P San and H T Nguyen)Neural Networks and Their Applications:Study of Limit Cycle Behavior of Weights of Perceptron (C Y F Ho and B W K Ling)Artificial Neural Network Modeling with Application to Nonlinear Dynamics (Yi Zhao)Solving Eigen-problems of Matrices by Neural Networks (Yiguang Liu, Zhisheng You, Bingbing Liu and Jiliu Zhou)Automated Screw Insertion Monitoring Using Neural Networks: A Computational Intelligence Approach to Assembly in Manufacturing (Bruno Lara, Lakmal D Seneviratne and Kaspar Althoefer)Support Vector Machines and Their Applications:On the Applications of Heart Disease Risk Classification and Hand-written Character Recognition Using Support Vector Machines (S R Alty, H K Lam and J Prada)Nonlinear Modeling Using Support Vector Machine for Heart Rate Response to Exercise (Weidong Chen, Steven W Su, Yi Zhang, Ying Guo, Nghir Nguyen, Branko G Celler and Hung T Nguyen)Machine Learning-based Nonlinear Model Predictive Control for Heart Rate Response to Exercise (Yi Zhang, Steven W Su, Branko G Celler and Hung T Nguyen)Intelligent Fault Detection and Isolation of

HVAC System Based on Online Support Vector Machine (Davood Dehestani, Ying Guo, Sai Ho Ling, Steven W Su and Hung T Nguyen) Readership: Graduates and researchers in computer science, especially those specialising in artificial intelligence, neural networks, fuzzy logic and pattern recognition. Keywords:Evolutionary Computation;Fuzzy Logic;Neural Networks;Support Vector MachineKey Features:Covers wide-ranging applications from pattern recognition, control systems to biomedical applications. Various computational techniques are proposed and presented in detail for the treatment of various problemsMost of the applications in this book are real and high impact, such as hypoglycaemia, detection for diabetes patients, cardio respiratory response estimation, pattern recognition and pose estimationAddresses important related problems and difficulties using the collective experiences and knowledge from the contributors, who are each prominent in their own area of research

Computational Science – ICCS 2020

Although the highly anticipated petascale computers of the near future will perform at an order of magnitude faster than today's quickest supercomputer, the scaling up of algorithms and applications for this class of computers remains a tough challenge. From scalable algorithm design for massive concurrency toperformance analyses and scientific visualization, Petascale Computing: Algorithms and Applications captures the state of the art in high-performance computing algorithms and applications. Featuring contributions from the world's leading experts in computational science, this edited collection explores the use of petascale computers for solving the most difficult scientific and engineering problems of the current century. Covering a wide range of important topics, the book illustrates how petascale computing can be applied to space and Earth science missions, biological systems, weather prediction, climate science, disasters, black holes, and gamma ray bursts. It details the simulation of multiphysics, cosmological evolution, molecular dynamics, and biomolecules. The book also discusses computational aspects that include the Uintah framework, Enzo code, multithreaded algorithms, petaflops, performance analysis tools, multilevel finite element solvers, finite element code development, Charm++, and the Cactus framework. Supplying petascale tools, programming methodologies, and an eight-page color insert, this volume addresses the challenging problems of developing application codes that can take advantage of the architectural features of the new petascale systems in advance of their first deployment.

Computational Neuroscience

This textbook provides an introduction to the growing interdisciplinary field of computational science. It combines a foundational development of numerical methods with a variety of illustrative applications spread across numerous areas of science and engineering. The intended audience is the undergraduate who has completed introductory coursework in mathematics and computer science. Students gain computational acuity by authoring their own numerical routines and by practicing with numerical methods as they solve computational models. This education encourages students to learn the importance of answering: How expensive is a calculation, how trustworthy is a calculation, and how might we model a problem to apply a desired numerical method? The text is written in two

parts. Part I provides a succinct, one-term inauguration into the primary routines on which a further study of computational science rests. The material is organized so that the transition to computational science from coursework in calculus, differential equations, and linear algebra is natural. Beyond the mathematical and computational content of Part I, students gain proficiency with elemental programming constructs and visualization, which are presented in MATLAB syntax. The focus of Part II is modeling, wherein students build computational models, compute solutions, and report their findings. The models purposely intersect numerous areas of science and engineering to demonstrate the pervasive role played by computational science.

Computational Science and Its Applications - ICCSA 2003

The five-volume set LNCS 3980-3984 constitutes the refereed proceedings of the International Conference on Computational Science and Its Applications, ICCSA 2006. The volumes present a total of 664 papers organized according to the five major conference themes: computational methods, algorithms and applications high performance technical computing and networks advanced and emerging applications geometric modelling, graphics and visualization information systems and information technologies. This is Part I.

Computational Complexity of Counting and Sampling

Emphasising essential methods and universal principles, this textbook provides everything students need to understand the basics of simulating materials behaviour. All the key topics are covered from electronic structure methods to microstructural evolution, appendices provide crucial background material, and a wealth of practical resources are available online to complete the teaching package. Modelling is examined at a broad range of scales, from the atomic to the mesoscale, providing students with a solid foundation for future study and research. Detailed, accessible explanations of the fundamental equations underpinning materials modelling are presented, including a full chapter summarising essential mathematical background. Extensive appendices, including essential background on classical and quantum mechanics, electrostatics, statistical thermodynamics and linear elasticity, provide the background necessary to fully engage with the fundamentals of computational modelling. Exercises, worked examples, computer codes and discussions of practical implementations methods are all provided online giving students the hands-on experience they need.

Computational Science and Its Applications – ICCSA 2020

This volume contains the proceedings of the first ICASE/LaRC Work shop on Computational Electromagnetics and Its Applications conducted by the Institute for Computer Applications in Science and Engineering and NASA Langley Research Center. We had several goals in mind when we decided, jointly with the Elec tromagnetics Research Branch, to organize this workshop on Computa tional Electromagnetics (CEM). Among our goals were a desire to obtain an overview of the current state of CEM, covering both algorithms and ap plications and their

effect on NASA's activities in this area. In addition, we wanted to provide an attractive setting for computational scientists with expertise in other fields, especially computational fluid dynamics (CFD), to observe the algorithms and tools of CEM at work. Our expectation was that scientists from both fields would discover mutually beneficial inter connections and relationships. Another goal was to learn of progress in solution algorithms for electromagnetic optimization and design problems; such problems make extensive use of field solvers and computational effi ciency is at a premium. To achieve these goals we assembled the renowned group of speakers from academia and industry whose talks are contained in this volume. The papers are printed in the same order in which the talks were pre sented at the meeting. The first paper is an overview of work currently being performed in the Electromagnetic Research Branch at the Langley Research Center.

High Performance Computing

Computational Complexity of Counting and Sampling provides readers with comprehensive and detailed coverage of the subject of computational complexity. It is primarily geared toward researchers in enumerative combinatorics, discrete mathematics, and theoretical computer science. The book covers the following topics: Counting and sampling problems that are solvable in polynomial running time, including holographic algorithms; #P-complete counting problems; and approximation algorithms for counting and sampling. First, it opens with the basics, such as the theoretical computer science background and dynamic programming algorithms. Later, the book expands its scope to focus on advanced topics, like stochastic approximations of counting discrete mathematical objects and holographic algorithms. After finishing the book, readers will agree that the subject is well covered, as the book starts with the basics and gradually explores the more complex aspects of the topic. Features: Each chapter includes exercises and solutions Ideally written for researchers and scientists Covers all aspects of the topic, beginning with a solid introduction, before shifting to computational complexity’s more advanced features, with a focus on counting and sampling

Performance Tuning of Scientific Applications

"This book provides information regarding state-of-the-art research outcomes and cutting-edge technology on various aspects of the human movement"--Provided by publisher.

Computational Science and Its Applications - ICCSA 2016

Most available books on computational electrodynamics are focused on FDTD, FEM, or other specific technique developed in microwave engineering. In contrast, Fourier Modal Method and Its Applications in Computational Nanophotonics is a complete guide to the principles and detailed mathematics of the up-to-date Fourier modal method of optical analysis. It takes readers through the implementation of MATLAB® codes for practical modeling of well-known and promising nanophotonic structures. The authors also address the limitations of the Fourier modal method. Features Provides a comprehensive guide to the principles,

methods, and mathematics of the Fourier modal method Explores the emerging field of computational nanophotonics Presents clear, step-by-step, practical explanations on how to use the Fourier modal method for photonics and nanophotonics applications Includes the necessary MATLAB codes, enabling readers to construct their own code Using this book, graduate students and researchers can learn about nanophotonics simulations through a comprehensive treatment of the mathematics underlying the Fourier modal method and examples of practical problems solved with MATLAB codes.

Introduction to Computational Materials Science

High Performance Computing: Programming and Applications presents techniques that address new performance issues in the programming of high performance computing (HPC) applications. Omitting tedious details, the book discusses hardware architecture concepts and programming techniques that are the most pertinent to application developers for achievi

Recent Progress in Computational Sciences and Engineering (2 vols)

With contributions from some of the most notable experts in the field, Performance Tuning of Scientific Applications presents current research in performance analysis. The book focuses on the following areas. Performance monitoring: Describes the state of the art in hardware and software tools that are commonly used for monitoring and measuring performance and managing large quantities of data Performance analysis: Discusses modern approaches to computer performance benchmarking and presents results that offer valuable insight into these studies Performance modeling: Explains how researchers deduce accurate performance models from raw performance data or from other high-level characteristics of a scientific computation Automatic performance tuning: Explores ongoing research into automatic and semi-automatic techniques for optimizing computer programs to achieve superior performance on any computer platform Application tuning: Provides examples that show how the appropriate analysis of performance and some deft changes have resulted in extremely high performance Performance analysis has grown into a full-fledged, sophisticated field of empirical science. Describing useful research in modern performance science and engineering, this book helps real-world users of parallel computer systems to better understand both the performance vagaries arising in scientific applications and the practical means for improving performance. Read about the book on HPCwire and insideHPC

Combinatorial Scientific Computing

Computational science is a rapidly growing multidisciplinary field concerned with the design, implementation, and use of mathematical models to analyze and solve real-world problems. It is an area of science that spans many disciplines and which involves the development of models and allows the use of computers to perform simulations or numerical analysis to understand problems that are computational and theoretical. Computational Science and its Applications provides an opportunity for readers to develop abilities to pose and solve problems that

combine insights from one or more disciplines from the natural sciences with mathematical tools and computational skills. This requires a unique combination of applied and theoretical knowledge and skills. The topics covered in this edited book are applications of wavelet and fractals, modeling by partial differential equations on flat structure as well as on graphs and networks, computational linguistics, prediction of natural calamities and diseases like epilepsy seizure, heart attack, stroke, biometrics, modeling through inverse problems, interdisciplinary topics of physics, mathematics, and medical science, and modeling of terrorist attacks and human behavior. The focus of this book is not to educate computer specialists, but to provide readers with a solid understanding of basic science as well as an integrated knowledge on how to use essential methods from computational science. Features: Modeling of complex systems Cognitive computing systems for real-world problems Presentation of inverse problems in medical science and their numerical solutions Challenging research problems in many areas of computational science This book could be used as a reference book for researchers working in theoretical research as well as those who are doing modeling and simulation in such disciplines as physics, biology, geoscience, and mathematics, and those who have a background in computational science.

Space-Filling Curves

The present book provides an introduction to using space-filling curves (SFC) as tools in scientific computing. Special focus is laid on the representation of SFC and on resulting algorithms. For example, grammar-based techniques are introduced for traversals of Cartesian and octree-type meshes, and arithmetisation of SFC is explained to compute SFC mappings and indexings. The locality properties of SFC are discussed in detail, together with their importance for algorithms. Templates for parallelisation and cache-efficient algorithms are presented to reflect the most important applications of SFC in scientific computing. Special attention is also given to the interplay of adaptive mesh refinement and SFC, including the structured refinement of triangular and tetrahedral grids. For each topic, a short overview is given on the most important publications and recent research activities.

Petascale Computing

The six volumes LNCS 11619-11624 constitute the refereed proceedings of the 19th International Conference on Computational Science and Its Applications, ICCSA 2019, held in Saint Petersburg, Russia, in July 2019. The 64 full papers, 10 short papers and 259 workshop papers presented were carefully reviewed and selected form numerous submissions. The 64 full papers are organized in the following five general tracks: computational methods, algorithms and scientific applications; high performance computing and networks; geometric modeling, graphics and visualization; advanced and emerging applications; and information systems and technologies. The 259 workshop papers were presented at 33 workshops in various areas of computational sciences, ranging from computational science technologies to specific areas of computational sciences, such as software engineering, security, artificial intelligence and blockchain technologies.

Computational Science and Its Applications – ICCSA 2018

The five volume set LNCS 10960 until 10964 constitutes the refereed proceedings of the 18th International Conference on Computational Science and Its Applications, ICCSA 2018, held in Melbourne, Australia, in July 2018.Apart from the general tracks, ICCSA 2018 also includes 34 international workshops in various areas of computational sciences, ranging from computational science technologies, to specific areas of computational sciences, such as computer graphics and virtual reality.The total of 265 full papers and 10 short papers presented in the 5-volume proceedings set of ICCSA 2018, were carefully reviewed and selected from 892 submissions.

Computational Science and Its Applications – ICCSA 2019

Computational science is an exciting new field at the intersection of the sciences, computer science, and mathematics because much scientific investigation now involves computing as well as theory and experiment. This textbook provides students with a versatile and accessible introduction to the subject. It assumes only a background in high school algebra, enables instructors to follow tailored pathways through the material, and is the only textbook of its kind designed specifically for an introductory course in the computational science and engineering curriculum. While the text itself is generic, an accompanying website offers tutorials and files in a variety of software packages. This fully updated and expanded edition features two new chapters on agent-based simulations and modeling with matrices, ten new project modules, and an additional module on diffusion. Besides increased treatment of high-performance computing and its applications, the book also includes additional quick review questions with answers, exercises, and individual and team projects. The only introductory textbook of its kind—now fully updated and expanded Features two new chapters on agent-based simulations and modeling with matrices Increased coverage of high-performance computing and its applications Includes additional modules, review questions, exercises, and projects An online instructor's manual with exercise answers, selected project solutions, and a test bank and solutions (available only to professors) An online illustration package is available to professors

An Introduction to Computational Science

This volume includes contributions from diverse disciplines including electrical engineering, biomedical engineering, industrial engineering, and medicine, bridging a vital gap between the mathematical sciences and neuroscience research. Covering a wide range of research topics, this volume demonstrates how various methods from data mining, signal processing, optimization and cutting-edge medical techniques can be used to tackle the most challenging problems in modern neuroscience.

Computational Science and Its Applications – ICCSA 2019

Computational Science and Its Applications – ICCSA 2017

The book consists of high-quality papers presented at the International Conference on Computational Science and Applications (ICCSA 2019), held at Maharashtra Institute of Technology World Peace University, Pune, India, from 7 to 9 August 2019. It covers the latest innovations and developments in information and communication technology, discussing topics such as soft computing and intelligent systems, web of sensor networks, drone operating systems, web of sensor networks, wearable smart sensors, automated guided vehicles and many more.

Computational Intelligence and Its Applications in Healthcare

The three-volume set, LNCS 2667, LNCS 2668, and LNCS 2669, constitutes the refereed proceedings of the International Conference on Computational Science and Its Applications, ICCSA 2003, held in Montreal, Canada, in May 2003. The three volumes present more than 300 papers and span the whole range of computational science from foundational issues in computer science and mathematics to advanced applications in virtually all sciences making use of computational techniques. The proceedings give a unique account of recent results in computational science.