Basic Structured Grid Generation With An Introduction To Unstructured Grid Generation By M Farrashkhalvat 2003 03 26

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Computational Science and Its Applications -- ICCSA 2012 - Beniamino Murgante 2012-06-16
The four-volume set LNCS 7333-7336 constitutes the refereed proceedings of the 12th International Conference on Computational Science and Its Applications, ICCSA 2012, held in Salvador de Bahia, Brazil, in June 2012. The four volumes contain papers presented in the following workshops: 7333 - advances in high performance algorithms and applications (AHPAA); bioinspired computing and applications (BIOCA); computational geometry and applicatons (CGA); chemistry and materials sciences and technologies (CMST); cities, technologies and planning (CTP); 7334 - econometrics and multidimensional evaluation in the urban environment (EMEUE); geographical analysis, urban modeling, spatial statistics (Geo-An-Mod); 7335 - optimization techniques and applications (OTA); mobile communications (MC); mobile-computing, sensind and actuation for cyber physical systems (MSA4CPS); remote sensing (RS); 7336 - software engineering processes and applications (SEPA); software quality (SQ); security and privacy in computational sciences (SPCS); soft computing and data engineering (SCDE). The topics of the fully refereed papers are structured according to the four major conference themes: 7333 - computational methods, algorithms and scientific application; 7334 - geometric modelling, graphics and visualization; 7335 - information systems and technologies; 7336 - high performance computing and networks.
Grid Generation Methods - Vladimir D. Liseikin 2013-04-18
This text is an introduction to methods of grid generation technology in scientific computing. Special attention is given to methods developed by the author for the treatment of singularly-perturbed equations, e.g. in modeling high Reynolds number flows. Functionals of conformality, orthogonality, energy and alignment are discussed.
Applied Computational Fluid Dynamics Techniques - Rainald Löhner 2008-04-30
Computational fluid dynamics (CFD) is concerned with the efficient numerical solution of the partial differential equations that describe fluid dynamics. CFD techniques are commonly used in the many areas of engineering where fluid behavior is an important factor. Traditional fields of application include aerospace and automotive design, and more recently, bioengineering and consumer and medical electronics. With Applied Computational Fluid Dynamics Techniques, 2nd edition, Rainald Löhner introduces the reader to the techniques required to achieve efficient CFD solvers, forming a bridge between basic theoretical and algorithmic aspects of the finite element method and its use in an industrial context where methods have to be both as simple but also as robust as possible. This heavily revised second edition takes a practice-oriented approach with a strong emphasis on efficiency, and offers important new and updated material on; Overlapping and embedded grid methods Treatment of free surfaces Grid generation Optimal use of supercomputing hardware Optimal shape and process design Applied Computational Fluid Dynamics Techniques, 2nd edition is a vital resource for engineers, researchers and designers working on CFD, aero and hydrodynamics simulations and bioengineering. Its unique practical approach will also appeal to graduate students of fluid mechanics and aero and hydrodynamics as well as biofluidics.
Software Systems for Surface Modeling and Grid Generation - Robert Edward Smith 1992
Basic Structured Grid Generation with an Introduction to Unstructured Grid Generation - M. Farrashkhalvat 2003
Finite element, finite volume and finite difference methods use grids to solve the numerous differential equations that arise in the modelling of physical systems in engineering. Structured grid generation forms an integral part of the solution of these procedures. Basic Structured Grid Generation provides the necessary mathematical foundation required for the successful generation of boundary-conforming grids and will be an important resource for postgraduate and practising engineers. The treatment of structured grid generation starts with basic geometry and tensor analysis before moving on to identify the variety of approaches that can be employed in the generation of structured grids. The book then introduces unstructured grid generation by explaining the basics of Delaunay triangulation and advancing front techniques. A companion website fully supports this book by providing numerical codes in FORTRAN 77/90 for both structured and unstructured grid generation which will help the reader to develop their understanding and make progress in grid generation. * A practical, straightforward approach to this complex subject for engineers and students. * A key technique for modelling physical systems. * Companion website provides free access to grid generation codes.
Grid Generation Methods - Vladimir D. Liseikin 2009-10-27
This text is an introduction to methods of grid generation technology in scientific computing. Special attention is given to methods developed by the author for the treatment of singularly-perturbed equations, e.g. in modeling high Reynolds number flows. Functionals of conformality, orthogonality, energy and alignment are discussed.
Computational Biomechanics of the Musculoskeletal System - Ming Zhang 2014-09-11
Computational biomechanics is an emerging research field that seeks to understand the complex biomechanical behaviors of normal and pathological human joints to come up with new methods of orthopedic treatment and rehabilitation. Computational Biomechanics of the Musculoskeletal System collects the latest research and cutting-edge techniques used in computational biomechanics, focusing on orthopedic and rehabilitation engineering applications. The book covers state-of-the-art techniques and the latest research related to computational biomechanics, in particular finite element analysis and its potential applications in orthopedics and rehabilitation engineering. It offers a glimpse into the exciting potentials for computational modeling in medical research and biomechanical simulation. The book is organized according to anatomical location—foot and ankle, knee, hip, spine, and head and teeth. Each chapter details the scientific questions/medical problems addressed by modeling, basic anatomy of the body part, computational model development and techniques used, related experimental studies for model setup and validation, and clinical applications. Plenty of useful biomechanical information is provided for a variety of applications, especially for the optimal design of body support devices and prosthetic implants. This book is an excellent resource for engineering students and young researchers in bioengineering. Clinicians involved in orthopedics and rehabilitation engineering may find this work to be both informative and highly relevant to their clinical practice.

Acta Numerica 1996: Volume 5 - Arieh Iserles 1996-07-25
Acta Numerica is an annual volume presenting survey papers in numerical analysis accessible to graduate students and researchers.
An Introduction to Computational Fluid Dynamics The Finite Volume Method, 2/e - Versteeg 2007

Applied Computational Fluid Dynamics Techniques - Rainald Löhner 2001-08-15
Computational Fluid Dynamics, or CFD - the science of how to efficiently solve numerically the Partial Differential equations describing the motion of fluids - is common in many areas of engineering. This is hardly surprising, as so many engineering objects, materials and processes deal with fluids (for example, aero- and hydrodynamics, melts, polymer extrusion, and bioengineering). Given the pervasive use of simulation techniques and virtual prototyping in egineering, physics and medicine, the CFD software business has been growing at a rate of approximately 250er year. This book introduces the reader to the techniques required to achieve efficient CFD solvers, and examines a wide range of topics including: data structures grid generation approximation theory approximation of operators solving of large systems of equations Euler and Navier-Stokes solvers, including TVD and FCT techniques mesh movement algorithms interpolation techniques adaptive mesh refinement efficient use of supercomputing hardware In addition, it covers the different topics and disciplines required to carry out a CFD run in the order they appear or are required during a run, rather than in the historical order in which these topics first appeared in CFD. Moreover, heavy emphasis is placed on CFD using unstructured, i.e. unordered grids of triangles and tetrahedra, as the only successfully industrialized CFD codes that provide user-support, updates and an evolving technology to a larger user base are based on unstructured grids. Also, once the problem has been defined for this more general class of grids, reverting to structured grids is a simple matter. Students and practicing engineers in CFD, fluid mechanics and related disciplines who purhcase Applied CFD Techniques will find it to be much more practical than other books currently available, as well as offering the benefits of valuable features (such as the inclusion of pieces of pseudo-code) in addtion to those outlined above.
Modeling and Simulation in Thermal and Fluids Engineering - Krishnan Murugesan 2022-07-29
This textbook comprehensively covers the fundamentals behind mathematical modeling of engineering problems to obtain the required solution. It comprehensively discusses modeling concepts through conservation principles with a proper blending of mathematical expressions. The text discusses the basics of governing equations in algebraic and differential forms and examines the importance of mathematics as a tool in modeling. It covers important topics including modeling of heat transfer problems, modeling of flow problems, modeling advection-diffusion problems and Navier-Stokes equations in depth. Pedagogical features including solved problems and unsolved exercises are interspersed throughout the text for better understanding. The textbook is primarily written for senior undergraduate and graduate students in the field of mechanical engineering for courses on modeling and simulation. The textbook will be accompanied by teaching resource including a solution manual for the instructors.
Mesh Enhancement - Glen A. Hansen 2005
This book focuses on mesh (grid) enhancement techniques ? specifically, the use of selected elliptic methods for both structured and unstructured meshes associated with computational physics applications. Mesh enhancement is the process in which an existing mesh is modified to better meet the requirements of the physics application. To provide the reader with sufficient background information, seven of the nine chapters contain a summary of the numerical simulation process, basic background on mesh terminology and generation approaches, computational geometry, discretization of differential equations, methods of solving linear and nonlinear algebraic systems, geometry of surfaces in Euclidean space, and general elliptic methods for mesh enhancement. Furthermore, these chapters use the concept of harmonic coordinates to develop a unifying framework, the Laplace-Beltrami system, which is the governing principle of the book. The final two chapters apply this scheme, along with other selected elliptic methods, to various structured and unstructured example problems.
Handbook of Fluid Dynamics - Richard W. Johnson 2016-04-06
Handbook of Fluid Dynamics offers balanced coverage of the three traditional areas of fluid dynamics-theoretical, computational, and experimental-complete with valuable appendices presenting the mathematics of fluid dynamics, tables of dimensionless numbers, and tables of the properties of gases and vapors. Each chapter introduces a different fluid
The Aeronautical Journal - 2005

Introduction to Applied Linear Algebra - Stephen Boyd 2018-06-07
A groundbreaking introduction to vectors, matrices, and least squares for engineering applications, offering a wealth of practical examples.
Applied Mechanics Reviews - 1995

Iterative Methods for Sparse Linear Systems - Yousef Saad 2003-04-01
Mathematics of Computing -- General.
Efficient High-Order Discretizations for Computational Fluid Dynamics - Martin Kronbichler 2021-01-04
The book introduces modern high-order methods for computational fluid dynamics. As compared to low order finite volumes predominant in today's production codes, higher order discretizations significantly reduce dispersion errors, the main source of error in long-time simulations of flow at higher Reynolds numbers. A major goal of this book is to teach the basics of the discontinuous Galerkin (DG) method in terms of its finite volume and finite element ingredients. It also discusses the computational efficiency of high-order methods versus state-of-the-art low order methods in the finite difference context, given that accuracy requirements in engineering are often not overly strict. The book mainly addresses researchers and doctoral students in engineering, applied mathematics, physics and high-performance computing with a strong interest in the interdisciplinary aspects of computational fluid dynamics. It is also well-suited for practicing computational engineers who would like to gain an overview of discontinuous Galerkin methods, modern algorithmic realizations, and high-performance implementations.
Mathematical Methods for Curves and Surfaces - Michael Floater 2014-02-03
This volume constitutes the thoroughly refereed post-conference proceedings of the 8th International Conference on Mathematical Methods for Curves and Surfaces, MMCS 2012, held in Oslo, Norway, in June/July 2012. The 28 revised full papers presented were carefully reviewed and selected from 135 submissions. The topics range from mathematical analysis of various methods to practical implementation on modern graphics processing units. The papers reflect the newest developments in these fields and also point to the latest literature.
Advanced Numerical Methods to Optimize Cutting Operations of Five Axis Milling Machines - Stanislav S. Makhanov 2007-04-18
This book presents new optimization algorithms designed to improve the efficiency of tool paths for five-axis NC machining of sculptured surfaces. The book covers both the structure of the SLAM problem in general and proposes a new extremely efficient approach. It can be used by undergraduate and graduate students and researchers in the field of NC machining and CAD/CAM as well as by corporate research groups for advanced optimization of cutting operations.
Introduction to Computational Fluid Dynamics: - Pradip Niyogi
Introduction to Computational Fluid Dynamics introduces a new subject which is an amalgamation of classical fluid dynamics and numerical analysis supported by powerful computers. Useful for advanced level B.Tech, M.Tech and M.Sc. students of variou
Introduction to Computational Fluid Dynamics - Anil W. Date 2005-08-08
Introduction to Computational Fluid Dynamics is a textbook for advanced undergraduate and first year graduate students in mechanical, aerospace and chemical engineering. The book emphasizes understanding CFD through physical principles and examples. The author follows a consistent philosophy of control volume formulation of the fundamental laws of fluid motion and energy transfer, and introduces a novel notion of 'smoothing pressure correction' for solution of flow equations on collocated grids within the framework of the well-known SIMPLE algorithm. The subject matter is developed by considering pure conduction/diffusion, convective transport in 2-dimensional boundary layers and in fully elliptic flow situations and phase-change problems in succession. The book includes chapters on discretization of equations for transport of mass, momentum and energy on Cartesian, structured curvilinear and

unstructured meshes, solution of discretised equations, numerical grid generation and convergence enhancement. Practising engineers will find this particularly useful for reference and for continuing education.

Computer Science Handbook - Allen B. Tucker 2004-06-28

When you think about how far and fast computer science has progressed in recent years, it's not hard to conclude that a seven-year old handbook may fall a little short of the kind of reference today's computer scientists, software engineers, and IT professionals need. With a broadened scope, more emphasis on applied computing, and more than 70 chap

Handbook of Grid Generation - Joe F. Thompson 1998-12-29

Handbook of Grid Generation addresses the use of grids (meshes) in the numerical solutions of partial differential equations by finite elements, finite volume, finite differences, and boundary elements. Four parts divide the chapters: structured grids, unstructured girds, surface definition, and adaption/quality. An introduction to each section provides a roadmap through the material. This handbook covers: Fundamental concepts and approaches Grid generation process Essential mathematical elements from tensor analysis and differential geometry, particularly relevant to curves and surfaces Cells of any shape - Cartesian, structured curvilinear coordinates, unstructured tetrahedra, unstructured hexahedra, or various combinations Separate grids overlaid on one another, communicating data through interpolation Moving boundaries and internal interfaces in the field Resolving gradients and controlling solution error Grid generation codes, both commercial and freeware, as well as representative and illustrative grid configurations Handbook of Grid Generation contains 37 chapters as well as contributions from more than 100 experts from around the world, comprehensively evaluating this expanding field and providing a fundamental orientation for practitioners.

Surface Modeling, Grid Generation, and Related Issues in Computational Fluid Dynamic (CFD) Solutions - 1995

Numerical Geometry, Grid Generation and Scientific Computing - Vladimir A. Garanzha 2019-10-10

The focus of these conference proceedings is on research, development, and applications in the fields of numerical geometry, scientific computing and numerical simulation, particularly in mesh generation and related problems. In addition, this year’s special focus is on Voronoi diagrams and their applications, celebrating the 150th birthday of G.F. Voronoi. In terms of content, the book strikes a balance between engineering algorithms and mathematical foundations. It presents an overview of recent advances in numerical geometry, grid generation and adaptation in terms of mathematical foundations, algorithm and software development and applications. The specific topics covered include: quasi-conformal and quasi-isometric mappings, hyperelastic deformations, multidimensional generalisations of the equidistribution principle, discrete differential geometry, spatial and metric encodings, Voronoi-Delaunay theory for tilings and partitions, duality in mathematical programming and numerical geometry, mesh-based optimisation and optimal control methods. Further aspects examined include iterative solvers for variational problems and algorithm and software development. The applications of the methods discussed are multidisciplinary and include problems from mathematics, physics, biology, chemistry, material science, and engineering.

Finite Element Mesh Generation - Daniel S.H. Lo 2015-01-15

Highlights the Progression of Meshing Technologies and Their Applications Finite Element Mesh Generation provides a concise and comprehensive guide to the application of finite element mesh generation over 2D domains, curved surfaces, and 3D space. Organised according to the geometry and dimension of the problem domains, it develops from the basic meshing algorithms to the most advanced schemes to deal with problems with specific requirements such as boundary conformity, adaptive and anisotropic elements, shape qualities, and mesh optimization. It sets out the fundamentals of popular techniques, including: Delaunay triangulation Advancing-front (ADF) approach Quadtree/Octree techniques Refinement and optimization-based strategies From the geometrical and the topological aspects and their associated operations and inter-relationships, each approach is vividly described and illustrated with examples. Beyond the algorithms, the book also explores the practice of using metric tensor and surface curvatures for generating anisotropic meshes on parametric space. It presents results from research including 3D anisotropic meshing, mesh generation over unbounded domains, meshing by means of intersection, re-meshing by Delaunay-ADF approach, mesh refinement and optimization, generation of hexahedral meshes, and large scale and parallel meshing, along with innovative unpublished meshing methods. The author provides illustrations of major meshing algorithms, pseudo codes, and programming codes in C++ or FORTRAN. Geared toward research centers, universities, and engineering companies, Finite Element Mesh Generation describes mesh generation methods and fundamental techniques, and also serves as a valuable reference for laymen and experts alike.

Grid Generation Methods - Vladimir D. Liseikin 1999-07-23

This text is an introduction to methods of grid generation technology in scientific computing. Special attention is given to methods developed by the author for the treatment of singularly-perturbed equations, e.g. in modeling high Reynolds number flows. Functionals of conformality, orthogonality, energy and alignment are discussed.

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Supercomputing - Vladimir Voevodin 2020-12-05

This book constitutes the refereed post-conference proceedings of the 6th Russian Supercomputing Days, RuSCDays 2020, held in Moscow, Russia, in September 2020.* The 51 revised full and 4 revised short papers presented were carefully reviewed and selected from 106 submissions. The papers are organized in the following topical sections: parallel algorithms; supercomputer simulation; HPC, BigData, AI: architectures, technologies, tools; and distributed and cloud computing. * The conference was held virtually due to the COVID-19 pandemic.

The Finite Volume Method in Computational Fluid Dynamics - F. Moukalled 2015-08-13

This textbook explores both the theoretical foundation of the Finite Volume Method (FVM) and its applications in Computational Fluid Dynamics (CFD). Readers will discover a thorough explanation of the FVM numerics and algorithms used for the simulation of incompressible and compressible fluid flows, along with a detailed examination of the components needed for the development of a collocated unstructured pressure-based CFD solver. Two particular CFD codes are explored. The first is uFVM, a three-dimensional unstructured pressure-based finite volume academic CFD code, implemented within Matlab. The second is OpenFOAM®, an open source framework used in the development of a range of CFD programs for the simulation of industrial scale flow problems. With over 220 figures, numerous examples and more than one hundred exercise on FVM numerics, programming, and applications, this textbook is suitable for use in an introductory course on the FVM, in an advanced course on numerics, and as a reference for CFD programmers and researchers.

Mathematical Aspects of Numerical Grid Generation - Jose E. Castillo 1991-01-01

The mathematical aspects of grid generation are discussed to provide a deeper understanding of the algorithms and their imitations.

Multiblock Grid Generation - Nigel P. Weatherill 2012-12-06

Computational Fluid Dynamics research, especially for aeronautics, continues to be a rewarding and industrially relevant field of applied science in which to work. An enthusiastic international community of

expert CFD workers continue to push forward the frontiers of knowledge in increasing number. Applications of CFD technology in many other sectors of industry are being successfully tackled. The aerospace industry has made significant investments and enjoys considerable benefits from the application of CFD to its products for the last two decades. This era began with the pioneering work ofMurman and others that took us into the transonic (potential flow) regime for the first time in the early 1970's. We have also seen momentous developments of the digital computer in this period into vector and parallel supercomputing. Very significant advances in all aspects of the methodology have been made to the point where we are on the threshold of calculating solutions for the Reynolds-averaged Navier-Stokes equations for complete aircraft configurations. However, significant problems and challenges remain in the areas of physical modelling, numerics and computing technology. The long term industrial requirements are captured in the U. S. Governments 'Grand Challenge' for 'Aerospace Vehicle Design' for the 1990's: 'Massively parallel computing systems and advanced parallel software technology and algorithms will enable the development and validation of multidisciplinary, coupled methods. These methods will allow the numerical simulation and design optimisation of complete aerospace vehicle systems throughout the flight envelope'.

Computational Engineering - Introduction to Numerical Methods - Michael Schäfer 2021-07-19

Numerical simulation methods in all engineering disciplines gains more and more importance. The successful and efficient application of such tools requires certain basic knowledge about the underlying numerical techniques. The text gives a practice-oriented introduction in modern numerical methods as they typically are applied in mechanical, chemical, or civil engineering. Problems from heat transfer, structural mechanics, and fluid mechanics constitute a thematical focus of the text. For the basic understanding of the topic aspects of numerical mathematics, natural sciences, computer science, and the corresponding engineering area are simultaneously important. Usually, the necessary information is distributed in different textbooks from the individual disciplines. In the present text the subject matter is presented in a comprehensive multidisciplinary way, where aspects from the different fields are treated insofar as it is necessary for general understanding. Overarching aspects and important questions related to accuracy, efficiency, and cost effectiveness are discussed. The topics are presented in an introductory manner, such that besides basic mathematical standard knowledge in analysis and linear algebra no further prerequisites are necessary. The book is suitable either for self-study or as an accompanying textbook for corresponding lectures. It can be useful for students of engineering disciplines as well as for computational engineers in industrial practice.

Fundamentals of Grid Generation - Patrick Knupp 2020-12-18

Fundamentals of Grid Generation is an outstanding text/reference designed to introduce students in applied mathematics, mechanical engineering, and aerospace engineering to structured grid generation. It provides excellent reference material for practitioners in industry, and it presents new concepts to researchers. Readers will learn what boundary-conforming grids are, how to generate them, and how to devise their own methods. The text is written in a clear, intuitive style that doesn't get bogged down in unnecessary abstractions. Topics covered include planar, surface, and 3-D grid generation; numerical techniques; solution adaptivity; the finite volume approach to discretization of hosted equations; concepts from elementary differential geometry; and the transformation of differential operators to general coordinate systems. The book also reviews the literature on algebraic, conformal, orthogonal, hyperbolic, parabolic, elliptic, biharmonic, and variational approaches to grid generation. This unique volume closes with the author's original methods of variational grid generation.

Numerical Geometry, Grid Generation and Scientific Computing - Vladimir A. Garanzha 2021-09-25

The focus of these conference proceedings is on research, development, and applications in the fields of numerical geometry, scientific computing and numerical simulation, particularly in mesh generation and related problems. In addition, this year’s special focus is on Delaunay triangulations and their applications, celebrating the 130th birthday of Boris Delaunay. In terms of content, the book strikes a balance between engineering algorithms and mathematical foundations. It presents an overview of recent advances in numerical geometry, grid generation and adaptation in terms of mathematical foundations, algorithm and software development and applications. The specific topics covered include: quasi-conformal and quasi-isometric mappings, hyperelastic deformations, multidimensional generalisations of the equidistribution principle, discrete differential geometry, spatial and metric encodings, Voronoi-Delaunay theory for tilings and partitions, duality in mathematical programming and numerical geometry, mesh-based optimisation and optimal control methods. Further aspects examined include iterative solvers for variational problems and algorithm and software development. The applications of the methods discussed are multidisciplinary and include problems from mathematics, physics, biology, chemistry, material science, and engineering.

Basic Structured Grid Generation - M Farrashkhalvat 2003-02-11

Finite element, finite volume and finite difference methods use grids to solve the numerous differential equations that arise in the modelling of physical systems in engineering. Structured grid generation forms an integral part of the solution of these procedures. Basic Structured Grid Generation provides the necessary mathematical foundation required for the successful generation of boundary-conforming grids and will be an important resource for postgraduate and practising engineers. The treatment of structured grid generation starts with basic geometry and tensor analysis before moving on to identify the variety of approaches that can be employed in the generation of structured grids. The book then introduces unstructured grid generation by explaining the basics of Delaunay triangulation and advancing front techniques. A practical, straightforward approach to this complex subject for engineers and students. A key technique for modelling physical systems.

Computational Fluid Dynamics: Principles and Applications - Jiri Blazek 2005-12-20

Computational Fluid Dynamics (CFD) is an important design tool in engineering and also a substantial research tool in various physical sciences as well as in biology. The objective of this book is to provide university students with a solid foundation for understanding the numerical methods employed in today’s CFD and to familiarise them with modern CFD codes by hands-on experience. It is also intended for engineers and scientists starting to work in the field of CFD or for those who apply CFD codes. Due to the detailed index, the text can serve as a reference handbook too. Each chapter includes an extensive bibliography, which provides an excellent basis for further studies.

Implementing Spectral Methods for Partial Differential Equations - David A. Kopriva 2009-05-27

This book explains how to solve partial differential equations numerically using single and multidomain spectral methods. It shows how only a few fundamental algorithms form the building blocks of any spectral code, even for problems with complex geometries.

Delaunay Mesh Generation - Siu-Wing Cheng 2016-04-19

Written by authors at the forefront of modern algorithms research, Delaunay Mesh Generation demonstrates the power and versatility of Delaunay meshers in tackling complex geometric domains ranging from polyhedra with internal boundaries to piecewise smooth surfaces. Covering both volume and surface meshes, the authors fully explain how and why these meshing algorithms work. The book is one of the first to integrate a vast amount of cutting-edge material on Delaunay triangulations. It begins with introducing the problem of mesh generation and describing algorithms for constructing Delaunay triangulations. The authors then present algorithms for generating high-quality meshes in polygonal and polyhedral domains. They also illustrate how to use restricted Delaunay triangulations to extend the algorithms to surfaces with ridges and patches and volumes with smooth surfaces. For researchers and graduate students, the book offers a rigorous theoretical analysis of mesh generation methods. It provides the necessary mathematical foundations and core theoretical results upon which researchers can build even better algorithms in the future. For engineers, the book shows how the algorithms work well in practice. It explains how to effectively implement them in the design and programming of mesh generation software.