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### XQGEFG - TATE SAMIR

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This volume comprises a carefully selected collection of articles emerging from and pertinent to the 2010 CFL-80 conference in Rio de Janeiro, celebrating the 80th anniversary of the Courant-Friedrichs-Lewy (CFL) condition. A major result in the field of numerical analysis, the CFL condition has influenced the research of many important mathematicians over the past eight decades, and this work is meant to take stock of its most important and current applications. The Courant-Friedrichs-Lewy (CFL) Condition: 80 Years After its Discovery will be of interest to practicing mathematicians, engineers, physicists, and graduate students who work with numerical methods.

Explores and brings together the existent body of knowledge on building performance analysis Shortlisted in the CIBSE 2020 Building Performance Awards Building performance is an important yet surprisingly complex concept. This book presents a comprehensive and systematic overview of the subject. It provides a working definition of building performance, and an in-depth discussion of the role building performance plays throughout the building life cycle. The book also explores the perspectives of various stakeholders, the functions of buildings, performance requirements, performance quantification (both predicted and measured), criteria for success, and the challenges of using performance analysis in practice. Building Performance Analysis starts by introducing the subject of building performance: its key terms, definitions, history, and challenges. It then develops a theoretical foundation for the subject, explores the complexity of performance assessment, and the way that performance analysis impacts on actual buildings. In doing so, it attempts to answer the following questions: What is building performance? How can building performance be measured and analyzed? How does the analysis of building performance guide the improvement of buildings? And what can the building domain learn from the way performance is handled in other disciplines? Assembles the current body of knowledge on building performance analysis in one unique resource Offers deep insights into the complexity of using building performance analysis throughout the entire building life cycle, including design, operation and management Contributes an emergent theory of building performance and its analysis Building Performance Analysis will appeal to the building science community, both from industry and academia. It specifically targets advanced students in architectural engineering, building services design, building performance simulation and similar fields who hold an interest in ensuring that buildings meet the needs of their stakeholders.

Physics of Continuous Matter: Exotic and Everyday Phenomena in the Macroscopic World, Second Edition provides an introduction to the basic ideas of continuum physics and their application to a wealth of macroscopic phenomena. The text focuses on the many approximate methods that offer insight into the rich physics hidden in fundamental continuum mechanics equations. Like its acclaimed predecessor, this second edition introduces mathematical tools on a "need-to-know" basis. New to the Second Edition This edition includes three new chapters on elasticity of slender rods, energy, and entropy. It also offers more margin drawings and photographs and improved images of simulations. Along with reorganizing much of the material, the author has revised many of the physics arguments and mathematical presentations to improve clarity and consistency. The collection of problems at the end of each chapter has been expanded as well. These problems further develop the physical and mathematical concepts presented. With worked examples throughout, this book clearly illustrates both qualitative and quantitative physics reasoning. It emphasizes the importance in understanding the physical principles behind equations and the conditions underlying approximations. A companion website provides a host of ancillary materials, including software programs, color figures, and additional problems.

For more than 50 years, the Springer VDI Heat Atlas has been an indispensable working means for

engineers dealing with questions of heat transfer. Featuring 50% more content, this new edition covers most fields of heat transfer in industrial and engineering applications. It presents the interrelationships between basic scientific methods, experimental techniques, model-based analysis and their transfer to technical applications.

According to the United Nations, three out of five people will be living in cities worldwide by the year 2030. The United States continues to experience urbanization with its vast urban corridors on the east and west coasts. Although urban weather is driven by large synoptic and meso-scale features, weather events unique to the urban environment arise from the characteristics of the typical urban setting, such as large areas covered by buildings of a variety of heights; paved streets and parking areas; means to supply electricity, natural gas, water, and raw materials; and generation of waste heat and materials. Urban Meteorology: Forecasting, Monitoring, and Meeting Users' Needs is based largely on the information provided at a Board on Atmospheric Sciences and Climate community workshop. This book describes the needs for end user communities, focusing in particular on needs that are not being met by current urban-level forecasting and monitoring. Urban Meteorology also describes current and emerging meteorological forecasting and monitoring capabilities that have had and will likely have the most impact on urban areas, some of which are not being utilized by the relevant end user communities. Urban Meteorology explains that users of urban meteorological information need high-quality information available in a wide variety of formats that foster its use and within time constraints set by users' decision processes. By advancing the science and technology related to urban meteorology with input from key end user communities, urban meteorologists can better meet the needs of diverse end users. To continue the advancement within the field of urban meteorology, there are both short-term needs-which might be addressed with small investments but promise large, quick returns-as well as future challenges that could require significant efforts and investments.

This book gathers selected contributions presented at the Enzo Levi and XX Annual Meeting of the Fluid Dynamic Division of the Mexican Physical Society in 2014. The individual papers explore recent advances in experimental and theoretical fluid dynamics and are suitable for use in both teaching and research. The fluid dynamics applications covered include multiphase flows, convection, diffusion, heat transfer, rheology, granular materials, viscous flows, porous media flows, geophysics and astrophysics. The contributions, some of which are introductory and avoid the use of complicated mathematics, are suitable for fourth-year undergraduate and graduate students. Accordingly, the book is of immense benefit to these students, as well as to scientists in the fields of physics, chemistry and engineering with an interest in fluid dynamics from experimental and theoretical points of view.

An understandable perspective on the types of space propulsion systems necessary to enable low-cost space flights to Earth orbit and to the Moon and the future developments necessary for exploration of the solar system and beyond to the stars.

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.

This book contains selected papers from the Fourth International Conference on Computational Methods in Marine Engineering, held at Instituto Superior Técnico, Technical University of Lisbon, Portugal in September 2011. Nowadays, computational methods are an essential tool of engineering, which includes a major field of interest in marine applications, such as the maritime and offshore industries and engineering challenges related to the marine environment and renewable energies. The 2011 Conference included 8 invited plenary lectures and 86 presentations distributed through 10 thematic sessions that covered many of the most relevant topics of marine engineering today. This book contains 16 selected papers from the Conference that cover "CFD for Offshore Applications", "Fluid-Structure Interaction", "Isogeometric Methods for Marine Engineering", "Marine/Offshore Renewable Energy", "Maneuvering and Seakeeping", "Propulsion and Cavitation" and "Ship Hydrodynamics". The papers were selected with the help of the recognized experts that collaborated in the organization of the thematic sessions of the Conference, which guarantees the high quality of the papers included in this book.

This new edition of the near-legendary textbook by Schlichting and revised by Gersten presents a comprehensive overview of boundary-layer theory and its application to all areas of fluid mechanics, with particular emphasis on the flow past bodies (e.g. aircraft aerodynamics). The new edition features an updated reference list and over 100 additional changes throughout the book, reflecting the latest advances on the subject.

Illustrates Calculations Using Machine and Technological Processes The conjugate heat transfer (CHT) problem addresses the thermal interaction between a body and fluid flowing over or through it. This is an essential consideration in nature and different areas of engineering, including mechanics, aerospace, nuclear engineering, biology, and meteorology. Advanced conjugate modeling of the heat transfer process is now used extensively in a wide range of applications. Conjugate Problems in Convective Heat Transfer addresses the latest theory, methods, and applications associated with both analytical and numerical methods of solution CHT problems and their exact and approximate solutions. It demonstrates how the true value of a CHT solution is derived by applying these solutions to contemporary engineering design analysis. Assembling cutting-edge information on modern modeling from more than 200 publications, this book presents more than 100 example applications in thermal treatment materials, machinery operation, and technological processes. Creating a practical review of current CHT development, the author includes methods associated with estimating heat transfer, particularly that from arbitrary non-isothermal surfaces in both laminar and turbulent flows. Harnesses the Modeling Power of CHT Unique in its consistent compilation and application of current knowledge, this book presents advanced CHT analysis as a powerful tool for modeling various device operations and technological processes, from relatively simple procedures to complex multistage, nonlinear processes.

Screw extruders are the most important of all polymer processing machines There is a need for a comprehensive book on this subject. This book emphasizes the understanding of the underlying principles of screw extrusion, the design and behavior of screw based machines. It helps the engineer to optimize his equipment and enhance production rates. Contents: · Introduction · Fundamentals · Screw Extrusion Technology · Technology of Single Screw Extrusion with Reciprocating Screws · Single Screw Extruder Analysis and Design · Twin and Multiscrew Extrusion

Numerical Computation of Internal and External Flows Volume 2: Computational Methods for Inviscid and Viscous Flows C. Hirsch, Vrije Universiteit Brussel, Brussels, Belgium This second volume deals with the applications of computational methods to the problems of fluid dynamics. It complements the first volume to provide an excellent reference source in this vital and fast growing area.

The author includes material on the numerical computation of potential flows and on the most up-to-date methods for Euler and Navier-Stokes equations. The coverage is comprehensive and includes detailed discussion of numerical techniques and algorithms, including implementation topics such as boundary conditions. Problems are given at the end of each chapter and there are comprehensive reference lists. Of increasing interest, the subject has powerful implications in such crucial fields as aeronautics and industrial fluid dynamics. Striking a balance between theory and application, the combined volumes will be useful for an increasing number of courses, as well as to practitioners and researchers in computational fluid dynamics. Contents Preface Nomenclature Part V: The Numerical Computation of Potential Flows Chapter 13 The Mathematical Formulations of the Potential Flow Model Chapter 14 The Discretization of the Subsonic Potential Equation Chapter 15 The Computation of Stationary Transonic Potential Flows Part VI: The Numerical Solution of the System of Euler Equations Chapter 16 The Mathematical Formulation of the System of Euler Equations Chapter 17 The Lax - Wendroff Family of Space-centred Schemes Chapter 18 The Central Schemes with Independent Time Integration Chapter 19 The Treatment of Boundary Conditions Chapter 20 Upwind Schemes for the Euler Equations Chapter 21 Second-order Upwind and High-resolution Schemes Part VII: The Numerical Solution of the Navier-Stokes Equations Chapter 22 The Properties of the System of Navier-Stokes Equations Chapter 23 Discretization Methods for the Navier-Stokes Equations Index

This book is designed to provide all the information required for a sound understanding of diseases of the nose and paranasal sinuses and the surgical techniques used in their management. After an opening section on basic science, clinical and radiological assessment is explained and individual chapters focus on conditions ranging from infectious diseases, allergic rhinitis, and nasal polyposis to trauma, malignancies, and skin diseases. A wide variety of surgical techniques are then described with the aid of high-quality illustrations, covering nasal airway procedures and surgical approaches to the paranasal sinuses, including diverse endoscopic and image-guided procedures, nasal reconstruction, and endonasal and external rhinoplasty. The book is a collaborative project between the new generation of Turkish specialists and well-known experts from across the world. It will be of value for ENT doctors in all countries, as well as for students and trainees and those working in ENT-related fields such as maxillo-facial surgery, pediatrics, allergology, neurology, infectious diseases, and neurosurgery.

Despite their variety, the vibration phenomena from many different engineering fields can be classified into a relatively few basic excitation mechanisms. The classification enables engineers to identify all possible sources of excitation in a given system and to assess potential dangers. This graduate-level text presents a synthesis of research results and practical experience from disparate fields in the form of engineering guidelines. It is particularly geared toward assessing the possible sources of excitation in a flow system, in identifying the actual danger spots, and in finding appropriate remedial measures or cures. Flow-induced vibrations are presented in terms of their basic elements: body oscillators, fluid oscillators, and sources of excitation. By stressing these basic elements, the authors provide a basis for the transfer of knowledge from one system to another, as well as from one engineering field to another. In this manner, well-known theories on cylinders in cross-flow or well-executed solutions from the field of wind engineering--to name just two examples--may be useful in other systems or fields on which information is scarce. The unified approach is broad enough to permit treatment of the major excitation mechanism, yet simple enough to be of practical use.

The book includes the best articles presented by researchers, academicians and industrial experts at the International Conference on "Innovative Design and Development Practices in Aerospace and Automotive Engineering (I-DAD 2018)". The book discusses new concept in designs, and analysis and manufacturing technologies for improved performance through specific and/or multi-functional design aspects to optimise the system size, weight-to-strength ratio, fuel efficiency and operational capability. Other aspects of the conference address the ways and means of numerical analysis, simulation and additive manufacturing to accelerate the product development cycles. Describing innovative methods, the book provides valuable reference material for educational and research organizations, as well as industry, wanting to undertake challenging projects of design engineering and product development.

The Art of UNIX Programming poses the belief that understanding the unwritten UNIX engineering tradition and mastering its design patterns will help programmers of all stripes to become better programmers. This book attempts to capture the engineering wisdom and design philosophy of the UNIX, Linux, and Open Source software development community as it has evolved over the past

three decades, and as it is applied today by the most experienced programmers. Eric Raymond offers the next generation of "hackers" the unique opportunity to learn the connection between UNIX philosophy and practice through careful case studies of the very best UNIX/Linux programs. This book explores computational fluid dynamics in the context of the human nose, allowing readers to gain a better understanding of its anatomy and physiology and integrates recent advances in clinical rhinology, otolaryngology and respiratory physiology research. It focuses on advanced research topics, such as virtual surgery, AI-assisted clinical applications and therapy, as well as the latest computational modeling techniques, controversies, challenges and future directions in simulation using CFD software. Presenting perspectives and insights from computational experts and clinical specialists (ENT) combined with technical details of the computational modeling techniques from engineers, this unique reference book will give direction to and inspire future research in this emerging field.

Dynamic Single-Use Bioreactors Used in Modern Liter- and m3- Scale Biotechnological Processes: Engineering Characteristics and Scaling Up, by Christian Löffelholz, Stephan C. Kaiser, Matthias Kraume, Regine Eibl, Dieter Eibl. Orbitally Shaken Single-Use Bioreactors, by Wolf Klöckner, Sylvia Diederichs, Jochen Büchs. Therapeutic Human Cells: Manufacture for Cell Therapy/Regenerative Medicine by Christian van den Bos, Robert Keefe, Carmen Schirmaier, Michael McCaman. Fast Single-Use VLP Vaccine Productions Based on Insect Cells and the Baculovirus Expression Vector System: Influenza as Case Study by Regine Eibl, Nina Steiger, Sabine Wellnitz, Tiago Vicente, Corinne John, Dieter Eibl. Microbial High Cell Density Fermentations in a Stirred Single-Use Bioreactor by Thomas Dreher, Bart Walcarius, Ute Husemann, Franziska Klingenberg, Christian Zahn, Thorsten Adams, Davy de Wilde, Peter Casteels, Gerhard Greller. Quorus Bioreactor: A New Perfusion-Based Technology for Microbial Cultivation by Sheena J. Fraser, Christian Endres. Cultivation of Marine Microorganisms in Single-Use Systems by Friederike Hillig, Maciej Pilarek, Stefan Junne, Peter Neubauer. Flexible Biomanufacturing Processes that Address the Needs of the Future by Bernhard Diel, Christian Manzke, Thorsten Peuker. An Approach to Quality and Security of Supply for Single-Use Bioreactors by Magali Barbaroux, Susanne Gerighausen, Heiko Hackel. A Risk Analysis for Production Processes with Disposable Bioreactors by Tobias Merseburger, Ina Pahl, Daniel Müller, Markus Tanner.

Developed from the author's graduate-level course on advanced mechanics of composite materials, Finite Element Analysis of Composite Materials with Abaqus shows how powerful finite element tools address practical problems in the structural analysis of composites. Unlike other texts, this one takes the theory to a hands-on level by actually solving

The waves that animate the surface of the oceans represent a deposit of renewable energy that for the most part is still unexploited today. This is not for lack of effort, as for more than two hundred years inventors, researchers and engineers have struggled to develop processes and systems to recover the energy of the waves. While all of these efforts have failed to converge towards a satisfactory technological solution, the result is a rich scientific and technical literature as well as extensive and varied feedback from experience. For the uninitiated, this abundance is an obstacle. In order to facilitate familiarization with the subject, we propose in this work a summary of the state of knowledge on the potential of wave energy as well as on the processes and technologies of its recovery (wave energy converters). In particular, we focus on the problem of positioning wave energy in the electricity market, the development of wave energy conversion technologies from a historical perspective, and finally the energy performance of the devices. This work is aimed at students, researchers, developers, industry professionals and decision makers who wish to acquire a global perspective and the necessary tools to understand the field. Reviews the state of knowledge and developments on wave energy recovery Presents the history of wave energy recovery Classifies the various systems for recovering this type of energy

The secondary settling tank (SST) plays a major role

Fluid flows are encountered in our daily life as well as in engineering industries. Identifying the temporal and spatial distribution of fluid dynamic properties is essential in analyzing the processes related to flows. These properties, such as velocity, turbulence, temperature, pressure, and concentration, play important roles in mass transfer, heat transfer, reaction rate, and force analysis. However, obtaining the analytical solution of these fluid property distributions is technically difficult or impossible. With the technique of finite difference methods or finite element methods, attaining numerical solutions from the partial differential equations of mass, momentum, and energy have become achievable. Therefore, computational fluid dynamics (CFD) has emerged and been widely applied in various fields. This book collects the recent studies that have applied the CFD technique in

analyzing several representative processes covering mechanical engineering, chemical engineering, environmental engineering, and thermal engineering.

Over the past few decades there has been a prolific increase in research and development in area of heat transfer, heat exchangers and their associated technologies. This book is a collection of current research in the above mentioned areas and discusses experimental, theoretical and calculation approaches and industrial utilizations with modern ideas and methods to study heat transfer for single and multiphase systems. The topics considered include various basic concepts of heat transfer, the fundamental modes of heat transfer (namely conduction, convection and radiation), thermophysical properties, condensation, boiling, freezing, innovative experiments, measurement analysis, theoretical models and simulations, with many real-world problems and important modern applications. The book is divided in four sections : "Heat Transfer in Micro Systems", "Boiling, Freezing and Condensation Heat Transfer", "Heat Transfer and its Assessment", "Heat Transfer Calculations", and each section discusses a wide variety of techniques, methods and applications in accordance with the subjects. The combination of theoretical and experimental investigations with many important practical applications of current interest will make this book of interest to researchers, scientists, engineers and graduate students, who make use of experimental and theoretical investigations, assessment and enhancement techniques in this multidisciplinary field as well as to researchers in mathematical modelling, computer simulations and information sciences, who make use of experimental and theoretical investigations as a means of critical assessment of models and results derived from advanced numerical simulations and improvement of the developed models and numerical methods.

Retaining the features that made previous editions perennial favorites, Fundamental Mechanics of Fluids, Third Edition illustrates basic equations and strategies used to analyze fluid dynamics, mechanisms, and behavior, and offers solutions to fluid flow dilemmas encountered in common engineering applications. The new edition contains completely re

This book contains a selection of the papers that were presented at the EUROMECH colloquium on particle-laden flow held at the University of Twente in 2006. The multiscale nature of this challenging field motivated the calling of the colloquium and reflects the central importance that the dispersion of particles in a flow has in various geophysical and environmental problems. The spreading of aerosols and soot in the air, the growth and dispersion of plankton blooms in seas and oceans, or the transport of sediment in rivers, estuaries and coastal regions are striking examples.

Geared toward advanced undergraduates and graduate students, this outstanding text surveys aeroelastic problems, their historical background, basic physical concepts, and the principles of analysis.

Aerosol Science and Technology: History and Reviews captures an exciting slice of history in the evolution of aerosol science. It presents in-depth biographies of four leading international aerosol researchers and highlights pivotal research institutions in New York, Minnesota, and Austria. One collection of chapters reflects on the legacy of the Pasadena smog experiment, while another presents a fascinating overview of military applications and nuclear aerosols. Finally, prominent researchers offer detailed reviews of aerosol measurement, processes, experiments, and technology that changed the face of aerosol science. This volume is the third in a series and is supported by the American Association for Aerosol Research (AAAR) History Working Group, whose goal is to produce archival books from its symposiums on the history of aerosol science to ensure a lasting record. It is based on papers presented at the Third Aerosol History Symposium on September 8 and 9, 2006, in St. Paul, Minnesota, USA.

Many introductions to fluid dynamics offer an illustrative approach that demonstrates some aspects of fluid behavior, but often leave you without the tools necessary to confront new problems. For more than a decade, Fluid Dynamics: Theoretical and Computational Approaches has supplied these missing tools with a constructive approach that made the book a bestseller. Now in its third edition, it supplies even more computational skills in addition to a solid foundation in theory. After laying the groundwork in theoretical fluid dynamics, independent of any particular coordinate system in order to allow coordinate transformation of the equations, the author turns to the technique of writing Navier-Stokes and Euler's equations, flow of inviscid fluids, laminar viscous flow, and turbulent flow. He also includes requisite mathematics in several "Mathematical Expositions" at the end of the book and provides abundant end-of-chapter problems. What's New in the Third Edition? New section on free surface flow New section on instability of flows through Chaos and nonlinear dissipative systems New section on formulation of the large eddy simulation (LES) problem New ex-

ample problems and exercises that reflect new and important topics of current interest. By integrating a strong theoretical foundation with practical computational tools, *Fluid Dynamics: Theoretical and Computational Approaches, Third Edition* is an indispensable guide to the methods needed to solve new and unfamiliar problems in fluid dynamics.

Scripting with Python makes you productive and increases the reliability of your scientific work. Here, the author teaches you how to develop tailored, flexible, and efficient working environments built from small programs (scripts) written in Python. The focus is on examples and applications of relevance to computational science: gluing existing applications and tools, e.g. for automating simulation, data analysis, and visualization; steering simulations and computational experiments; equipping programs with graphical user interfaces; making computational Web services; creating interactive interfaces with a Maple/Matlab-like syntax to numerical applications in C/C++ or Fortran; and building flexible object-oriented programming interfaces to existing C/C++ or Fortran libraries.

This IBM® Redbooks® publication demonstrates and documents that IBM Power Systems™ high-performance computing and technical computing solutions deliver faster time to value with powerful solutions. Configurable into highly scalable Linux clusters, Power Systems offer extreme performance for demanding workloads such as genomics, finance, computational chemistry, oil and gas exploration, and high-performance data analytics. This book delivers a high-performance computing solution implemented on the IBM Power System S822LC. The solution delivers high application performance and throughput based on its built-for-big-data architecture that incorporates IBM POWER8® processors, tightly coupled Field Programmable Gate Arrays (FPGAs) and accelerators, and faster I/O by using Coherent Accelerator Processor Interface (CAPI). This solution is ideal for clients that need more processing power while simultaneously increasing workload density and reducing datacenter floor space requirements. The Power S822LC offers a modular design to scale from a single rack to hundreds, simplicity of ordering, and a strong innovation roadmap for graphics processing units (GPUs). This publication is targeted toward technical professionals (consultants, technical support staff, IT Architects, and IT Specialists) responsible for delivering cost effective high-performance computing (HPC) solutions that help uncover insights from their data so they can optimize business results, product development, and scientific discoveries.

This book presents a concise, yet thorough, reference for all heat transfer coefficient correlations

and data for all types of cylinders: vertical, horizontal, and inclined. This book covers all natural convection heat transfer laws for vertical and inclined cylinders and is an excellent resource for engineers working in the area of heat transfer engineering.

This volume collects selected contributions from the "Fourth Tetrahedron Workshop on Grid Generation for Numerical Computations", which was held in Verbania, Italy in July 2013. The previous editions of this Workshop were hosted by the Weierstrass Institute in Berlin (2005), by INRIA Rocquencourt in Paris (2007), and by Swansea University (2010). This book covers different, though related, aspects of the field: the generation of quality grids for complex three-dimensional geometries; parallel mesh generation algorithms; mesh adaptation, including both theoretical and implementation aspects; grid generation and adaptation on surfaces - all with an interesting mix of numerical analysis, computer science and strongly application-oriented problems.

This book describes the available technologies that can be employed to reduce energy consumption and greenhouse emissions in the steel- and ironmaking industries. Ironmaking and steelmaking are some of the largest emitters of carbon dioxide (over 2Gt per year) and have some of the highest energy demand (25 EJ per year) among all industries; to help mitigate this problem, the book examines how changes can be made in energy efficiency, including energy consumption optimization, online monitoring, and energy audits. Due to negligible regulations and unparalleled growth in these industries during the past 15-20 years, knowledge of best practices and innovative technologies for greenhouse gas remediation is paramount, and something this book addresses. Presents the most recent technological solutions in productivity analyses and dangerous emissions control and reduction in steelmaking plants; Examines the energy saving and emissions abatement efficiency for potential solutions to emission control and reduction in steelmaking plants; Discusses the application of the results of research conducted over the last ten years at universities, research centers, and industrial institutions.

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 grids, surface definition, and adaptation/quality. An introduction to each section provides a roadmap through the material. This handbook covers: Fundamental concepts and approaches Grid generation process Essential mathe-

tical 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 free-ware, 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.

Volume 34 of *Reviews in Mineralogy* focuses on methods to describe the extent and consequences of reactive flow and transport in natural subsurface systems. Since the field of reactive transport within the Earth Sciences is a highly multidisciplinary area of research, including geochemistry, geology, physics, chemistry, hydrology, and engineering, this book is an attempt to some extent bridge the gap between these different disciplines. This volume contains the contributions presented at a short course held in Golden, Colorado, October 25-27, 1996 in conjunction with the Mineralogical Society of America's (MSA) Annual Meeting with the Geological Society of America in Denver, Colorado.

This book contains selected papers of the 11th OpenFOAM® Workshop that was held in Guimarães, Portugal, June 26 - 30, 2016. The 11th OpenFOAM® Workshop had more than 140 technical/scientific presentations and 30 courses, and was attended by circa 300 individuals, representing 180 institutions and 30 countries, from all continents. The OpenFOAM® Workshop provided a forum for researchers, industrial users, software developers, consultants and academics working with OpenFOAM® technology. The central part of the Workshop was the two-day conference, where presentations and posters on industrial applications and academic research were shown. OpenFOAM® (Open Source Field Operation and Manipulation) is a free, open source computational toolbox that has a larger user base across most areas of engineering and science, from both commercial and academic organizations. As a technology, OpenFOAM® provides an extensive range of features to solve anything from complex fluid flows involving chemical reactions, turbulence and heat transfer, to solid dynamics and electromagnetics, among several others. Additionally, the OpenFOAM technology offers complete freedom to customize and extend its functionalities.