Essentials Of Computational Fluid Dynamics

This book, an outgrowth of the author's distinguished lecture series in Japan in 1995, identifies and describes current results and issues in certain areas of computational fluid dynamics, mathematical physics, and linear algebra. Notable among these are the author's new notion of numerical rotational release for the understanding of correct solution capture when modelling time-dependent higher Reynolds number incompressible flows, the author's fundamental new perspective of wavelets seen as stochastic processes, and the author's new theory of antieigenvalues which has created an entirely new view of iterative methods in computational linear algebra. Contents:Recent Developments in Computational Fluid Dynamics:Cavity FlowHovering AerodynamicsCapturing Correct SolutionsRecent Developments in Mathematical Physics:Probabilistic and Deterministic DescriptionScaling TheoriesChaos in Iterative MapsRecent Developments in Linear Algebra:Operator TrigonometryAntieigenvaluesComputational Linear Algebra Readership: Mathematicians, engineers and physicists. keywords:Aerodynamics;Dragonfly;Kolmogorov Systems;Wavelets;Time Operator;Chaos;Neural Networks;Antieigenvalues;Numerical Methods;Linear Algebra

Computational Fluid Dynamics, Second Edition, provides an introduction to CFD fundamentals that focuses on the use of commercial CFD software to solve engineering problems. This new edition provides expanded coverage of CFD techniques including discretisation via finite element and spectral element as well as finite difference and finite volume methods and multigrid method. There is additional coverage of high-pressure fluid dynamics and meshless approach to provide a broader overview of the application areas where CFD can be used. The book combines an appropriate level of mathematical background, worked examples, computer screen shots, and step-by-step processes, walking students through modeling and computing as well as interpretation of CFD results. It is ideal for senior level undergraduate and graduate students of mechanical, aerospace, civil, chemical, environmental and marine engineering. It can also help beginner users of commercial CFD software tools (including CFX and FLUENT). A more comprehensive coverage of CFD techniques including discretisation via finite element and spectral element as well as finite difference and finite volume methods and multigrid method Coverage of different approaches to CFD grid generation in order to closely match how CFD meshing is being used in industry Additional coverage of high-pressure fluid dynamics and meshless approach to provide a broader overview of the application areas where CFD can be used 20% new content

Cengel and Cimbala's Fluid Mechanics Fundamentals and Applications, communicates directly with tomorrow's engineers in a simple yet precise manner, while covering the basic principles and equations of fluid mechanics in the context of numerous and diverse real-world engineering examples. The text helps students develop an intuitive understanding of fluid mechanics by emphasizing the physics, using figures, numerous photographs and visual aids to reinforce the physics. The highly visual approach enhances the learning of fluid mechanics by students. This text distinguishes itself from others by the way the material is

presented - in a progressive order from simple to more difficult, building each chapter upon foundations laid down in previous chapters. In this way, even the traditionally challenging aspects of fluid mechanics can be learned effectively. McGraw-Hill's Connect, is also available as an optional, add on item. Connect is the only integrated learning system that empowers students by continuously adapting to deliver precisely what they need, when they need it, how they need it, so that class time is more effective. Connect allows the professor to assign homework, quizzes, and tests easily and automatically grades and records the scores of the student's work. Problems are randomized to prevent sharing of answers an may also have a "multi-step solution" which helps move the students' learning along if they experience difficulty.

Vogel / Fliegen / Technik.

This textbook covers fundamental and advanced concepts of computational fluid dynamics, a powerful and essential tool for fluid flow analysis. It discusses various governing equations used in the field, their derivations, and the physical and mathematical significance of partial differential equations and the boundary conditions. It covers fundamental concepts of finite difference and finite volume methods for diffusion, convection-diffusion problems both for cartesian and non-orthogonal grids. The solution of algebraic equations arising due to finite difference and finite volume discretization are highlighted using direct and iterative methods. 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 and aerospace engineering, for a course on computational fluid dynamics and heat transfer. The textbook will be accompanied by teaching resources including a solution manual for the instructors. Written clearly and with sufficient foundational background to strengthen fundamental knowledge of the topic. Offers a detailed discussion of both finite difference and finite volume methods. Discusses various higher-order bounded convective schemes, TVD discretisation schemes based on the flux limiter essential for a general purpose CFD computation. Discusses algorithms connected with pressure-linked equations for incompressible flow. Covers turbulence modelling like k-?, k-?, SST k-?, Reynolds Stress Transport models. A separate chapter on best practice guidelines is included to help CFD practitioners.

Design Optimization of Fluid Machinery: Applying Computational Fluid Dynamics and Numerical Optimization Drawing on extensive research and experience, this timely reference brings together numerical optimization methods for fluid machinery and its key industrial applications. It logically lays out the context required to understand computational fluid dynamics by introducing the basics of fluid mechanics, fluid machines and their components. Readers are then introduced to single and multi-objective optimization methods, automated optimization, surrogate models, and evolutionary algorithms. Finally, design approaches and applications in the areas of pumps, turbines, compressors, and other fluid machinery systems are clearly explained, with special emphasis on renewable energy systems. Written by an international team of leading experts in the field Brings together optimization methods using computational fluid dynamics for fluid machinery in one handy reference Features industrially important applications, with key sections on renewable energy systems Design Optimization of Fluid Machinery is an essential

guide for graduate students, researchers, engineers working in fluid machinery and its optimization methods. It is a comprehensive reference text for advanced students in mechanical engineering and related fields of fluid dynamics and aerospace engineering.
Dieses Fachbuch gilt unumstritten als das Standardwerk der Strömungslehre. In der von renommierten Strömungswissenschaftlern verfassten aktuellen 14. Auflage wurden alle Kapitel auf den neuesten Erkenntnisstand gebracht. In ganzheitlicher Weise werden die Strömungen vom phänomenologischen Standpunkt her betrachtet und Systematiken daraus abgeleitet. Den Autoren gelingt es, den Blick für das Verständnis von Einflüssen und Vorgängen zu schärfen. Der Prandtl ist als klassisches Lehrbuch aber auch als Nachschlagewerk besonders gut geeignet. Die Printauflage wurde erstmalig parallel zu einer living edition auf Springer Reference entwickelt, bei der Änderungen jederzeit eingearbeitet werden können.
Essentials & Applications of Food Engineering provides a comprehensive understanding of food engineering operations and their practical and industrial utility. It presents pertinent case studies, solved numerical problems, and multiple choice questions in each chapter and serves as a ready reference for classroom teaching and exam preparations. The first part of this textbook contains the introductory topics on units and dimensions, material balance, energy balance, and fluid flow. The second part deals with the theory and applications of heat and mass transfer, psychrometry, and reaction kinetics. The subsequent chapters of the book present the heat and mass transfer operations such as evaporation, drying, refrigeration, freezing, mixing, and separation. The final section focuses on the thermal, non-thermal, and nanotechnology-based novel food processing techniques, 3D food printing, active and intelligent food packaging, and fundamentals of CFD modeling. Features Features 28 case studies to provide a substantial understanding of the practical and industrial applications of various food engineering operations Includes 178 solved numerical problems and 285 multiple choice questions Highlights the application of mass balance in food product traceability and the importance of viscosity measurement in a variety of food products Provides updated information on novel food processing techniques such as cold plasma, 3D food printing, nanospray drying, electrospraying, and electrospinning The textbook is designed for undergraduate and graduate students pursuing Food Technology and Food Process Engineering courses. This book would also be of interest to course instructors and food industry professionals.
This book describes how modeling fluid flow in chemical reactors may offer solutions that improve design, operation, and performance of reactors. Chemical reactors are any vessels, tubes, pipes, or tanks in which chemical reactions take place. Computational Flow Modeling for Chemical Reactor Engineering will show the reactor engineer how to define the specific roles of computational flow modeling, select appropriate tools, and apply these tools to link reactor hardware to reactor performance. Overall methodology is illustrated with numerous case studies. Industry has invested substantial funds in computational flow modeling which will pay off only if it can be used to realize significant performance enhancement in chemical reactors. No other single source exists which provides the information contained in this book.
Every fluid dynamicist will at some point need to use computation. Thinking about the physics, constraints and the requirements early on will be rewarded with benefits in time, effort, accuracy and expense. How these benefits can be realised is illustrated in this guide for would-be researchers and beginning graduate students to some of the standard methods and common pitfalls of computational fluid mechanics. Based on a lecture course that the author has developed over 20 years, the text is split into three parts. The quick introduction enables students to solve numerically a basic nonlinear problem by a simple method in just three hours. The follow-up part expands on all the key essentials,

including discretisation (finite differences, finite elements and spectral methods), time-stepping and linear algebra. The final part is a selection of optional advanced topics, including hyperbolic equations, the representation of surfaces, the boundary integral method, the multigrid method, domain decomposition, the fast multipole method, particle methods and wavelets.

This book provides a valuable information source for olfaction and taste which includes a comprehensive and timely overview of the current state of knowledge of use for olfaction and taste machines Presents original, latest research in the field, with an emphasis on the recent development of human interfacing Covers the full range of artificial chemical senses including olfaction and taste, from basic through to advanced level Timely project in that mobile robots, olfactory displays and odour recorders are currently under research, driven by commercial demand

Covers the basic principles and equations of fluid mechanics in the context of numerous and diverse real-world engineering examples. This title helps students develop an intuitive understanding of fluid mechanics by emphasizing the physics, using figures, numerous photographs and visual aids to reinforce the physics.

Dieses Lehrbuch behandelt ergänzend zu den Grundlagenwerken der Strömungsmechanik die praktische Anwendung numerischer Methoden in Industrieprojekten. Es werden zunächst die Grundgleichungen der Strömungsmechanik wiederholt und für die Lösung mit numerischen Algorithmen aufgearbeitet. Die Diskretisierung des Strömungsfeldes einschließlich der Netz-Generierung sowie ausgewählte Lösungsverfahren der Finite-Differenzen-, Finite-Volumen und Finite-Elemente-Methoden werden dargestellt. Die Anwendung strömungsmechanischer Software für die Lösung von Industrieproblemen der Kraftfahrzeug-, Energie- und Umwelttechnik, Luft- und Raumfahrt sowie Bio- und Medizintechnik werden eingehend behandelt. Die aktuelle Auflage enthält jetzt völlig neu Anwendungsbeispiele aus dem Bereich der Bioströmungsmechanik.

Leading interventional cardiologists, including Patrick Serruys, provide the gold-standard reference on the treatment of restenosis for interventional cardiologists. Dr. Serruys, who pioneered the use of drug-eluting stents, and other pioneers in the field, cover everything from non-invasive imaging, to eluting stents, to brachytherapy through to the latest molecular biology-based treatments including antisense, stem cells and gene therapy.

Essentials of Computational Fluid Dynamics is one of the series of books covering various topics of science, technology and management published by London School of Management Studies. The book will cover the introduction to the Topic and can be used as a very useful course study material for students pursuing their studies in undergraduate and graduate levels in universities and colleges and those who want to learn the topic in brief via a short and complete resource. We hope you find this book useful is shaping your future career, Please send us your enquiries related to our publications to press@lsms.org.uk London School of Management Studies www.lsms.org.uk

Uniquely outlines CFD theory in a manner relevant to environmental applications. This book addresses the basic topics in CFD modelling in a thematic manner to provided the necessary theoretical background, as well as providing global cases studies showing how CFD models can be used in practice demonstrating how good practice can be achieved , with reference to both established and new applications. First book to apply CFD to the environmental sciences Written at a level suitable for non-mathematicians

This book is an update and extension of the classic textbook by Ludwig Prandtl, Essentials of Fluid Mechanics. It is based on the 10th German edition with additional material included. Chapters on wing aerodynamics, heat transfer, and layered flows have been revised and extended, and there are new chapters on fluid mechanical instabilities and biomedical fluid mechanics. References to the literature have been

kept to a minimum, and the extensive historical citations may be found by referring to previous editions. This book is aimed at science and engineering students who wish to attain an overview of the various branches of fluid mechanics. It will also be useful as a reference for researchers working in the field of fluid mechanics.

Cengel and Cimbala's Fluid Mechanics Fundamentals and Applications, communicates directly with tomorrow's engineers in a simple yet precise manner. The text covers the basic principles and equations of fluid mechanics in the context of numerous and diverse real-world engineering examples. The text helps students develop an intuitive understanding of fluid mechanics by emphasizing the physics, using figures, numerous photographs and visual aids to reinforce the physics. The highly visual approach enhances the learning of Fluid mechanics by students. This text distinguishes itself from others by the way the material is presented - in a progressive order from simple to more difficult, building each chapter upon foundations laid down in previous chapters. In this way, even the traditionally challenging aspects of fluid mechanics can be learned effectively. McGraw-Hill's Connect, is also available as an optional, add on item. Connect is the only integrated learning system that empowers students by continuously adapting to deliver precisely what they need, when they need it, how they need it, so that class time is more effective. Connect allows the professor to assign homework, quizzes, and tests easily and automatically grades and records the scores of the student's work. Problems are randomized to prevent sharing of answers an may also have a "multi-step solution" which helps move the students' learning along if they experience difficulty.

Computational Fluid Dynamics enables engineers to model and predict fluid flow in powerful, visually impressive ways and is one of the core engineering design tools, essential to the study and future work of many engineers. This textbook is designed to explcitly meet the needs engineering students taking a first course in CFD or computer-aided engineering. Fully course matched, with the most extensive and rigorous pedagogy and features of any book in the field, it is certain to be a key text. The only course text available specifically designed to give an applications-lead, commercial software oriented approach to understanding and using Computational Fluid Dynamics (CFD). Meets the needs of all engineering disciplines that use CFD. The perfect CFD teaching resource: clear, straightforward text, step-by-step explanation of mathematical foundations, detailed worked examples, end-of-chapter knowledge check exercises, and homework assignment questions

The study of the movement of liquids and gases is known as fluid dynamics. This book on fluid dynamics deals with the applied and computational methods of fluid dynamics. This field follows the basic laws of motion and force to measure and predict the various flows that occur to a body, either at motion or rest. Fluid dynamics is applied to a wide variety of fields such as hydrology, limnology, aeronautics, astronomy, etc. This book is a compilation of chapters that discuss the most vital concepts and emerging trends of this field. It is meant for students who are looking for an elaborate reference text on fluid dynamics. This text is a complete source of knowledge on the present status of this important field.

If substitutes have been appointed, have they been briefed on the Computational fluid dynamics goals and received regular communications as to the progress to date? Does Computational fluid dynamics analysis isolate the fundamental causes of problems? How do we Lead with Computational fluid dynamics in Mind? Are there any constraints known that bear on the ability to perform Computational fluid dynamics work? How is the team addressing them? Design Thinking: Integrating Innovation, Computational fluid dynamics, and Brand Value This amazing Computational fluid dynamics self-assessment will make you the reliable Computational fluid dynamics domain authority by revealing just what you need to know to be fluent and ready for any Computational fluid dynamics challenge. How do I reduce the effort in the Computational fluid dynamics work to be done to get problems solved? How can I ensure that plans of action include every Computational

fluid dynamics task and that every Computational fluid dynamics outcome is in place? How will I save time investigating strategic and tactical options and ensuring Computational fluid dynamics costs are low? How can I deliver tailored Computational fluid dynamics advice instantly with structured going-forward plans? There's no better guide through these mind-expanding questions than acclaimed best-selling author Gerard Blokdyk. Blokdyk ensures all Computational fluid dynamics essentials are covered, from every angle: the Computational fluid dynamics self-assessment shows succinctly and clearly that what needs to be clarified to organize the required activities and processes so that Computational fluid dynamics outcomes are achieved. Contains extensive criteria grounded in past and current successful projects and activities by experienced Computational fluid dynamics practitioners. Their mastery, combined with the easy elegance of the self-assessment, provides its superior value to you in knowing how to ensure the outcome of any efforts in Computational fluid dynamics are maximized with professional results. Your purchase includes access details to the Computational fluid dynamics self-assessment dashboard download which gives you your dynamically prioritized projects-ready tool and shows you exactly what to do next. Your exclusive instant access details can be found in your book.

Optical Remote Sensing is one of the main technologies used in sea surface monitoring. Optical Remote Sensing of Ocean Hydrodynamics investigates and demonstrates capabilities of optical remote sensing technology for enhanced observations and detection of ocean environments. It provides extensive knowledge of physical principles and capabilities of optical observations of the oceans at high spatial resolution, 1-4m, and on the observations of surface wave hydrodynamic processes. It also describes the implementation of spectral-statistical and fusion algorithms for analyses of multispectral optical databases and establishes physics-based criteria for detection of complex wave phenomena and hydrodynamic disturbances including assessment and management of optical databases. This book explains the physical principles of high-resolution optical imagery of the ocean surface, discusses for the first time the capabilities of observing hydrodynamic processes and events, and emphasizes the integration of optical measurements and enhanced data analysis. It also covers both the assessment and the interpretation of dynamic multispectral optical databases and includes applications for advanced studies and nonacoustic detection. This book is an invaluable resource for researches, industry professionals, engineers, and students working on cross-disciplinary problems in ocean hydrodynamics, optical remote sensing of the ocean and sea surface remote sensing. Readers in the fields of geosciences and remote sensing, applied physics, oceanography, satellite observation technology, and optical engineering will learn the theory and practice of optical interactions with the ocean.

Provides a clear, concise, and self-contained introduction to Computational Fluid Dynamics (CFD) This comprehensively updated new edition covers the fundamental concepts and main methods of modern Computational Fluid Dynamics (CFD). With expert guidance and a wealth of useful techniques, the book offers a clear, concise, and accessible account of the essentials needed to perform and interpret a CFD analysis. The new edition adds a plethora of new information on such topics as the techniques of interpolation, finite volume discretization on unstructured grids, projection methods, and RANS turbulence modeling. The book has been thoroughly edited to improve clarity and to reflect the recent changes in the practice of CFD. It also features a large number of new end-of-chapter problems. All the attractive features that have contributed to the success of the first edition are retained by

this version. The book remains an indispensable guide, which: Introduces CFD to students and working professionals in the areas of practical applications, such as mechanical, civil, chemical, biomedical, or environmental engineering Focuses on the needs of someone who wants to apply existing CFD software and understand how it works, rather than develop new codes Covers all the essential topics, from the basics of discretization to turbulence modeling and uncertainty analysis Discusses complex issues using simple worked examples and reinforces learning with problems Is accompanied by a website hosting lecture presentations and a solution manual Essential Computational Fluid Dynamics, Second Edition is an ideal textbook for senior undergraduate and graduate students taking their first course on CFD. It is also a useful reference for engineers and scientists working with CFD applications.

Covered from the vantage point of a user of a commercial flow package, Essentials of Computational Fluid Dynamics provides the information needed to competently operate a commercial flow solver. This book provides a physical description of fluid flow, outlines the strengths and weaknesses of computational fluid dynamics (CFD), presents the basics of the discretization of the equations, focuses on the understanding of how the flow physics interact with a typical finite-volume discretization, and highlights the approximate nature of CFD. It emphasizes how the physical concepts (mass conservation or momentum balance) are reflected in the CFD solutions while minimizing the required mathematical/numerical background. In addition, it uses cases studies in mechanical/aero and biomedical engineering, includes MATLAB and spreadsheet examples, codes and exercise questions. The book also provides practical demonstrations on core principles and key behaviors and incorporates a wide range of colorful examples of CFD simulations in various fields of engineering. In addition, this author: Introduces basic discretizations, the linear advection equation, and forward, backward and central differences Proposes a prototype discretization (first-order upwind) implemented in a spreadsheet/MATLAB example that highlights the diffusive character Looks at consistency, truncation error, and order of accuracy Analyzes the truncation error of the forward, backward, central differences using simple Taylor analysis Demonstrates how the of upwinding produces Artificial Viscosity (AV) and its importance for stability Explains how to select boundary conditions based on physical considerations Illustrates these concepts in a number of carefully discussed case studies Essentials of Computational Fluid Dynamics provides a solid introduction to the basic principles of practical CFD and serves as a resource for students in mechanical or aerospace engineering taking a first CFD course as well as practicing professionals needing a brief, accessible introduction to CFD.

Your step-by-step guide to learning Autodesk Revit Architecture This detailed introduction to Revit Architecture features straightforward explanations and real-world, hands-on tutorials to teach new users the software's core features and functions. Presented in the context of real-world workflows, and using real-world projects, each chapter contains a discussion of the "why" and "how" that is reinforced with a step-by-step tutorial so you'll gain practical and applicable experience with the core features of Revit Architecture. The new pedagogical approach emphasizes learning skills to help you prepare for the Revit certification exams. Learn at your pace with step-by-step exercises, illustrated with full-color screenshots and downloadable Revit tutorial files Work

with floors, ceilings, walls, and curtain walls Use modeling and massing to explore design ideas Use the Family Editor to create and manage families Understand effective worksharing, BIM workflows, and file management Use rendering and visualization techniques to make your design come alive Prepare for Revit certification exams With Autodesk Revit Architecture Essentials, you are only a step away from better, faster building design.

The Autodesk(r) CFD 2017 Essentials student guide instructs students in the use of the Autodesk(r) CFD software. The software provides computational fluid dynamics and thermal simulation tools to predict product performance, optimize designs, and validate product behavior before manufacturing. Through a hands-on, practice-intensive curriculum, students acquire the knowledge required to work in the Autodesk CFD environment to setup and conduct thermal and flow analyses on part and assembly models. Exercises are provided that cover electronic cooling, flow control, and AEC type models. Topics Covered Open and navigate the Autodesk CFD environment to conduct flow and thermal analyses on part and assembly models. Use the Model Assessment Toolkit to investigate the suitability of model geometry for analysis, and use Autodesk(r) SimStudio Tools to make required changes to the CAD geometry. Create internal and external fluid volumes. Setup analyses by applying appropriate materials, boundary conditions and mesh settings. Refine mesh to obtain a proper solution. Apply appropriate solver settings to run your analyses and converge to an acceptable solution. Use the visualization tools to compare summary images, summary values, and summary plots of your analyses to compare design and scenario results of an Autodesk CFD analysis. Conduct a final validation of your solution by running through a validation checklist. Prerequisites This student guide assumes that a student has some Flow and Thermal analysis knowledge and can interpret results. The main goal of this student guide is to teach a user that is new to the Autodesk CFD software how to navigate the interface to successfully analyze a model. This student guide was written using the 20160317 build of the Autodesk CFD 2017 software. The software user-interface and workflow may vary if newer versions of the software are being used. The exercises were completed using the advanced solver license. Instructions are provided to complete this class with a basic solver license.

Bei der Digitalisierung handelt es sich zweifelsohne um eine zentrale Veränderung der Systemarchitektur unserer Gesellschafts- und Wirtschaftsformen. Durch den massiven Wandel der Rahmenbedingungen büßt der Faktor der Erfahrung etliches an Bedeutung ein. Es liegt auf der Hand, dass diese bis dato unbekannte Situation als Nährboden für Ängste unterschiedlichster Art fungieren kann. Der vorliegende Sammelband begreift es als zentrale gesellschaftliche Aufgabe der angewandten Wissenschaften, multidisziplinäre Zugänge zu dieser Thematik zu eröffnen, die zum weiteren Austausch über die Fachgrenzen hinweg einladen sollen.

Die Überarbeitung für die 10. deutschsprachige Auflage von Hermann Schlichtings Standardwerk wurde wiederum von Klaus Gersten geleitet, der schon die umfassende Neuformulierung der 9. Auflage vorgenommen hatte. Es wurden durchgängig Aktualisierungen vorgenommen, aber auch das Kapitel 15 von Herbert Oertel jr. neu bearbeitet. Das Buch gibt einen umfassenden Überblick über den Einsatz der Grenzschicht-Theorie in allen Bereichen der Strömungsmechanik. Dabei liegt der Schwerpunkt bei

den Umströmungen von Körpern (z.B. Flugzeugaerodynamik). Das Buch wird wieder den Studenten der Strömungsmechanik wie auch Industrie-Ingenieuren ein unverzichtbarer Partner unerschöpflicher Informationen sein.

This book is a brief introduction to the fundamental concepts of computational fluid dynamics (CFD). It is addressed to beginners, and presents the ABC's or bare essentials of CFD in their simplest and most transparent form. The approach taken is to describe the principal analytical tools required, including truncation-error and stability analyses, followed by the basic elements or building blocks of CFD, which are numerical methods for treating sources, diffusion, convection, and pressure waves. Finally, it is shown how those ingredients may be combined to obtain self-contained numerical methods for solving the full equations of fluid dynamics. The book should be suitable for self-study, as a textbook for CFD short courses, and as a supplement to more comprehensive CFD and fluid dynamics texts.

Ludwig Prandtl has been called the father of modern fluid mechanics, and this updated and extended edition of his classic text on the field is based on the 12th German edition with additional material included.

Essentials of Computational Fluid DynamicsCRC Press

This book will explain how heat and mass transport in buildings can be modelled using commercial and educational tools, with a focus on helping those who want to use those tools to understand and predict the performance of buildings, but who may not be experts in CFD. The fundamentals of modelling will be fully covered and then extended to show how those models can be used to simulate the behaviour of buildings. The aim is to ensure the reader understands the essentials of modelling and can use the existing tools effectively and knowledgably. Modelling and simulation involve many assumptions and simplifications, so the book covers these topics fully, ensuring the reader understands and can justify those assumptions and simplifications. In addition, it addresses uncertainties in the selection of possible options to ensure the reader can get the most from existing heat and mass transport modelling tools.

Das Buch bietet einen Überblick über die numerischen Methoden zur Lösung strömungsmechanischer Probleme. Die in der Praxis meistgenutzten Methoden werden detailliert beschrieben. Behandelt werden auch fortgeschrittene Methoden, wie die Simulation von Turbulenzen und Parallel-Verarbeitung. Das Buch beschreibt die Grundlagen und Prinzipien der verschiedenen Methoden. Numerische Genauigkeit und Abschätzung sowie Fehlerreduktion werden detailliert mit vielen Beispielen behandelt. Alle Computercodes sind über den Server ftp.springer.de des Springer-Verlages erhältlich (Internet).

Traditional research methodologies in the human respiratory system have always been challenging due to their invasive nature. Recent advances in medical imaging and computational fluid dynamics (CFD) have accelerated this research. This book compiles and details recent advances in the modelling of the respiratory system for researchers, engineers, scientists, and health practitioners. It breaks down the complexities of this field and provides both students and scientists with an introduction and starting point to the physiology of the respiratory system, fluid dynamics and advanced CFD modeling tools. In addition to a brief introduction to the physics of the respiratory system and an overview of computational methods, the book contains best-practice

guidelines for establishing high-quality computational models and simulations. Inspiration for new simulations can be gained through innovative case studies as well as hands-on practice using pre-made computational code. Last but not least, students and researchers are presented the latest biomedical research activities, and the computational visualizations will enhance their understanding of physiological functions of the respiratory system.