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Continuous Casting - Michael Vynnycky 2019-07-30

Continuous casting is an industrial process whereby molten metal is solidified into a semi-finished billet, bloom, or slab for subsequent rolling in finishing mills; it is the most frequently used process to cast not only steel, but also aluminium and copper alloys. Since its widespread introduction for steel in the 1950s, it has evolved to achieve improved yield, quality, productivity and cost efficiency. It allows lower-cost production of metal sections with better quality, due to the inherently lower costs of continuous, standardized production of a product, as well as providing increased control over the process through automation. Nevertheless, challenges remain and new ones appear, as ways are sought to minimize casting defects and to cast alloys that could originally only be cast via other means. This Special Issue of the journal "Metals" consists of 14 research articles that cover many aspects of experimental work and theoretical modelling related to the ongoing development of continuous casting processes.

Building Physics - Sa? o Medved 2021-10-01

The book presents the theoretical background of building physics, dealing with the evaluation of physical phenomena related to heat transfer and energy use in

buildings, water and water vapour transfer in building structures, daylighting and electric lighting of buildings, sound transmission in building structures and protection against noise, the occurrence and spread of fires in buildings and the thermal response of cities. It contains numerical and computational evaluation methods, numerous computational case studies and examples of experimental analyses. The book demonstrates that the considered physical processes affect the quality of living and working comfort in indoor and outdoor environment.

Advances in Applied Mechanical Engineering - Hari Kumar Voruganti 2020-02-01

This book presents select peer reviewed proceedings of the International Conference on Applied Mechanical Engineering Research (ICAMER 2019). The books examines various areas of mechanical engineering namely design, thermal, materials, manufacturing and industrial engineering covering topics like FEA, optimization, vibrations, condition monitoring, tribology, CFD, IC engines, turbo-machines, automobiles, manufacturing processes, machining, CAM, additive manufacturing, modelling and simulation of manufacturing processing, optimization of manufacturing processing, supply chain management, and operations management. In addition, recent studies on composite materials, materials characterization, fracture and fatigue, advanced materials, energy storage, green building, phase change materials and structural change monitoring are also covered. Given the contents, this book will be useful for students, researchers and professionals working in mechanical engineering and allied fields.

Multiscale Modeling for Process Safety Applications - Arnab Chakrabarty 2015-11-29

Multiscale Modeling for Process Safety Applications is a new reference demonstrating the implementation of multiscale modeling techniques on process safety applications. It is a valuable resource for readers interested in theoretical simulations and/or computer simulations of hazardous scenarios. As multi-scale modeling is a computational technique for solving problems involving multiple scales, such as how a flammable vapor cloud might behave if ignited, this book provides information on the fundamental topics of toxic, fire, and air explosion modeling, as well as modeling jet and pool fires using computational fluid dynamics. The book goes on to cover nanomaterial toxicity, QPSR

analysis on relation of chemical structure to flash point, molecular structure and burning velocity, first principle studies of reactive chemicals, water and air reactive chemicals, and dust explosions. Chemical and process safety professionals, as well as faculty and graduate researchers, will benefit from the detailed coverage provided in this book. Provides the only comprehensive source addressing the use of multiscale modeling in the context of process safety Bridges multiscale modeling with process safety, enabling the reader to understand mapping between problem detail and effective usage of resources Presents an overall picture of addressing safety problems in all levels of modeling and the latest approaches to each in the field Features worked out examples, case studies, and a question bank to aid understanding and involvement for the reader

Fire design of concrete structures in accordance with CEB FIP model code 90 - FIB – International Federation for Structural Concrete 1991-07-01

Handbook of Vegetables and Vegetable Processing - Nirmal Sinha 2010-11-19

Vegetables are an important article of commerce both in developed and developing economies. Many studies point to importance of vegetables in our diet. Handbook of Vegetables and Vegetable Processing serves as a reference handbook on vegetables and vegetable processing containing the latest developments and advances in this fast growing field. The book can be considered as a companion to Y. H. Hui's popular Handbook of Fruits and Fruit Processing (2006). Handbook of Vegetables and Vegetable Processing is contemporary in scope, with in-depth coverage of new interdisciplinary developments and practices in the field of vegetables emphasizing processing, preservation, packaging, and nutrition and food safety. Coverage includes chapters on the biology, horticultural biochemistry, microbiology, nutrient and bioactive properties of vegetables and their significant commercialization by the food industry worldwide. Full chapters are devoted to major vegetables describing aspects ranging from chemistry to processing and preservation. World-renowned editors and authors have contributed to this essential handbook on vegetables and their production, technology, storage, processing, packaging, safety and commercial product development. Special Features: Coverage includes biology and classification, physiology,

biochemistry, flavor and sensory properties, microbial safety and HACCP principles, nutrient and bioactive properties In-depth descriptions of key processes including, minimal processing, freezing, pasteurization and aseptic processing, fermentation, drying, packaging, and application of new technologies Entire chapters devoted to important aspects of over 20 major commercial vegetables including avocado, table olives and textured vegetable proteins Unparalleled expertise on important topics from more than 50 respected authors

Manufacturing Techniques for Materials - T.S. Srivatsan 2018-04-09

Manufacturing Techniques for Materials: Engineering and Engineered provides a cohesive and comprehensive overview of the following: (i) prevailing and emerging trends, (ii) emerging developments and related technology, and (iii) potential for the commercialization of techniques specific to manufacturing of materials. The first half of the book provides the interested reader with detailed chapters specific to the manufacturing of emerging materials, such as additive manufacturing, with a valued emphasis on the science, technology, and potentially viable practices specific to the manufacturing technique used. This section also attempts to discuss in a lucid and easily understandable manner the specific advantages and limitations of each technique and goes on to highlight all of the potentially viable and emerging technological applications. The second half of this archival volume focuses on a wide spectrum of conventional techniques currently available and being used in the manufacturing of both materials and resultant products. Manufacturing Techniques for Materials is an invaluable tool for a cross-section of readers including engineers, researchers, technologists, students at both the graduate level and undergraduate level, and even entrepreneurs.

Laser Material Processing - William M. Steen 2010-11-30

The informal style of Laser Material Processing (4th Edition) will guide you smoothly from the basics of laser physics to the detailed treatment of all the major materials processing techniques for which lasers are now essential. • Helps you to understand how the laser works and to decide which laser is best for your purposes. • New chapters on laser physics, drilling, micro- and nanomanufacturing and biomedical laser processing reflect the changes in the field since the

last edition, updating and completing the range of practical knowledge about the processes possible with lasers already familiar to established users of this well-known text. • Provides a firm grounding in the safety aspects of laser use. • Now with end-of-chapter exercises to help students assimilate information as they learn. • The authors' lively presentation is supported by a number of original cartoons by Patrick Wright and Noel Ford which will bring a smile to your face and ease the learning process.

Numerical Methods for Diffusion Phenomena in Building Physics - Nathan Mendes 2019-11-29

This book is the second edition of Numerical methods for diffusion phenomena in building physics: a practical introduction originally published by PUCPRESS (2016). It intends to stimulate research in simulation of diffusion problems in building physics, by providing an overview of mathematical models and numerical techniques such as the finite difference and finite-element methods traditionally used in building simulation tools. Nonconventional methods such as reduced order models, boundary integral approaches and spectral methods are presented, which might be considered in the next generation of building-energy-simulation tools. In this reviewed edition, an innovative way to simulate energy and hydrothermal performance are presented, bringing some light on innovative approaches in the field.

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.

Thermal Food Processing - Da-Wen Sun 2012-05-16

Thermal processing remains one of the most important processes in the food industry. Now in its second edition, Thermal Food Processing: New Technologies and Quality Issues continues to explore the latest developments in the field. Assembling the work of a worldwide panel of experts, this volume highlights topics vital to the food industry today an

Tundish Technology for Clean Steel Production - Yogeshwar Sahai (Ph. D.) 2008

Continuous casting of steel has become a widely used process and an important step in steel production. The worldwide share of continuously cast steel has increased significantly in the last 25 years or so. However, concurrent with this increase in production levels are stringent quality requirements that have become crucial in the face of progressively increasing machine throughputs and larger product dimensions. As a result, steel cleanliness and strict composition control are now the primary concern of steelmakers.The tundish is the last metallurgical vessel through which molten metal flows before solidifying in the continuous casting mold. During the transfer of metal through the tundish, molten steel interacts with refractories, slag, and the atmosphere. Thus, the proper design and operation of a tundish are important for delivering steel of strict composition and quality. This pioneering book is the first of its kind to cover all aspects of tundish technology, ranging from fundamental aspects and theory necessary for understanding the basic concepts of tundish operations to operational aspects of the tundish. Written by internationally recognized experts in continuous casting technology in general and tundish technology in particular, this book is sufficiently fundamental to serve as a graduate-level textbook on process metallurgy or as an important reference for metallurgical researchers; at the same time, it is comprehensive enough to contribute to the understanding of scientists and engineers engaged in research and development in the steel industry.

Maintenance, Safety, Risk, Management and Life-Cycle Performance of Bridges - Nigel Powers 2018-07-04

Maintenance, Safety, Risk, Management and Life-Cycle Performance of Bridges contains lectures and papers presented at the Ninth International Conference on Bridge Maintenance, Safety and Management (IABMAS 2018), held in Melbourne, Australia, 9-13 July 2018. This volume consists of a book of extended abstracts and a USB card containing the full papers of 393 contributions presented at IABMAS 2018, including the T.Y. Lin Lecture, 10 Keynote Lectures, and 382 technical papers from 40 countries. The contributions presented at IABMAS 2018 deal with the state of the art as well as emerging concepts and innovative applications related to the main aspects of bridge maintenance, safety, risk,

management and life-cycle performance. Major topics include: new design methods, bridge codes, heavy vehicle and load models, bridge management systems, prediction of future traffic models, service life prediction, residual service life, sustainability and life-cycle assessments, maintenance strategies, bridge diagnostics, health monitoring, non-destructive testing, field testing, safety and serviceability, assessment and evaluation, damage identification, deterioration modelling, repair and retrofitting strategies, bridge reliability, fatigue and corrosion, extreme loads, advanced experimental simulations, and advanced computer simulations, among others. This volume provides both an up-to-date overview of the field of bridge engineering and significant contributions to the process of more rational decision-making on bridge maintenance, safety, risk, management and life-cycle performance of bridges for the purpose of enhancing the welfare of society. The Editors hope that these Proceedings will serve as a valuable reference to all concerned with bridge structure and infrastructure systems, including students, researchers and engineers from all areas of bridge engineering.

ICRRM 2019 – System Reliability, Quality Control, Safety, Maintenance and Management - Vinit Kumar Gunjan 2019-06-13

Content of this proceedings discusses emerging trends in structural reliability, safety and disaster management, covering topics like total quality management, risk maintenance and design for reliability. Some papers also address chemical process reliability, reliability analysis and engineering applications in chemical process equipment systems and includes a chapter on reliability evaluation models of chemical systems. Accepted papers from 2019 International Conference on Reliability, Risk Maintenance and Engineering Management (ICRRM 2019) are part of this conference proceeding. It offers useful insights to road safety engineers, disaster management professionals involved in product design and probabilistic methods in manufacturing systems.

Temperature Calculation in Fire Safety Engineering - Ulf Wickstr? m 2016-05-25

This book provides a consistent scientific background to engineering calculation methods applicable to analyses of materials reaction-to-fire, as well as fire resistance of structures. Several new and unique formulas and diagrams which facilitate calculations are presented. It focuses on problems involving high temperature conditions and, in particular,

defines boundary conditions in a suitable way for calculations. A large portion of the book is devoted to boundary conditions and measurements of thermal exposure by radiation and convection. The concepts and theories of adiabatic surface temperature and measurements of temperature with plate thermometers are thoroughly explained.Also presented is a renewed method for modeling compartment fires, with the resulting simple and accurate prediction tools for both pre- and post-flashover fires. The final chapters deal with temperature calculations in steel, concrete and timber structures exposed to standard time-temperature fire curves. Useful temperature calculation tools are included, and several examples demonstrate how the finite element code TASEF can be used to calculate temperature in various configurations. Temperature Calculation in Fire Safety Engineering is intended for researchers, students, teachers, and consultants in fire safety engineering. It is also suitable for others interested in analyzing and understanding fire, fire dynamics, and temperature development. Review questions and exercises are provided for instructor use.

Fire Safety Engineering Design of Structures, Third Edition - John A. Purkiss 2013-12-05

Designing structures to withstand the effects of fire is challenging, and requires a series of complex design decisions. This third edition of Fire Safety Engineering Design of Structures provides practising fire safety engineers with the tools to design structures to withstand fires. This text details standard industry design decisions, and offers expert design advice, with relevant historical data. It includes extensive data on materials' behaviour and modeling -- concrete, steel, composite steel-concrete, timber, masonry, and aluminium. While weighted to the fire sections of the Eurocodes, this book also includes historical data to allow older structures to be assessed. It extensively covers fire damage investigation, and includes as far back as possible, the background to code methods to enable the engineer to better understand why certain procedures are adopted. What's new in the Third Edition? An overview in the first chapter explains the types of design decisions required for optimum fire performance of a structure, and demonstrates the effect of temperature rise on structural performance of structural elements. It extends the sections on less common engineering materials. The section on computer modelling now includes material on coupled

heat and mass transfer, enabling a better understanding of the phenomenon of spalling in concrete. It includes a series of worked examples, and provides an extensive reference section. Readers require a working knowledge of structural mechanics and methods of structural design at ambient conditions, and are helped by some understanding of thermodynamics of heat transfer. This book serves as a resource for engineers working in the field of fire safety, consultants who regularly carry out full fire safety design for structure, and researchers seeking background information. Dr John Purkiss is a chartered civil and structural engineer/consultant and former lecturer in structural engineering at Aston University, UK. Dr Long-Yuan Li is Professor of Structural Engineering at Plymouth University, UK, and a Fellow of the Institution of Structural Engineers.

EPD Congress 2015 - James Yurko 2016-12-10

EPD Congress is an annual collection that addresses extraction and processing metallurgy. The papers in this book are drawn from symposia held at the 2015 Annual Meeting of The Minerals, Metals & Materials Society. The 2015 edition includes papers from the following symposia: •Materials Processing Fundamentals •Solar Cell Silicon •High-Temperature Electrochemistry II

Gas Turbine Heat Transfer and Cooling Technology - Je-Chin Han 2012-11-27

A comprehensive reference for engineers and researchers, Gas Turbine Heat Transfer and Cooling Technology, Second Edition has been completely revised and updated to reflect advances in the field made during the past ten years. The second edition retains the format that made the first edition so popular and adds new information mainly based on selec

CFD Modeling and Simulation in Materials Processing 2018 - Laurentiu Nastac 2018-01-10

This collection presents contributions on computational fluid dynamics (CFD) modeling and simulation of engineering processes from researchers and engineers involved in the modeling of multiscale and multiphase phenomena in material processing systems. The following processes are covered: Additive Manufacturing (Selective Laser Melting and Laser Powder Bed Fusion); Ironmaking and Steelmaking (Ladle Metallurgical Furnace, EAF, Continuous Casting, Blown Converter, Reheating Furnace, Rotary Hearth Furnace); Degassing; High Pressure Gas Atomization of Liquid Metals; Electroslag Remelting; Electrokinetic Deposition; Friction

Stir Welding; Quenching; High Pressure Die Casting; Core Injection Molding; Evaporation of Metals; Investment Casting; Electromagnetic Levitation; Ingot Casting; Casting and Solidification with External Field (electromagnetic stirring and ultrasonic cavitation) Interaction and Microstructure Evolution The collection also covers applications of CFD to engineering processes, and demonstrates how CFD can help scientists and engineers to better understand the fundamentals of engineering processes.

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.

Applications of Computation in Mechanical Engineering - Dean Vu? ini? 2022-11-28

This volume includes select peer reviewed proceedings from the 3rd International Conference on Computing in Mechanical Engineering (ICCME 2021) discussing the application of computer based simulations in mechanical and allied engineering disciplines. The book shows advanced applications of numerical techniques in different areas of mechanical engineering. The topics covered include numerical modelling, simulations and optimization best practices in various challenging domains like fluid dynamics, combustion in IC engines, heat transfer analysis, vibration damping and control, chemical and process engineering, mechanics of machining, nano fluidics and material science. This book will be a useful resource to students, researchers and engineers

working on multidisciplinary engineering problems, specially focusing on mechanical engineering and applied mathematics issues, with hope that it will impact future developments in engineering disciplines and motivate advancements and innovations in technical sciences.

Direct-Chill Casting of Light Alloys - D. G. Eskin 2013-06-25

Direct-chill casting is the major production route for wrought aluminium and magnesium alloys that are later deformed (rolled, extruded, forged) to the final products. To aid in this process, this book provides comprehensive coverage on topics such as the history of process development in this field, industrial applications, including vertical and horizontal casting, melt preparation, fundamentals of solidification in DC casting, and more. The first book targeted for the industrial researcher and practitioner, it pulls together the practice and process of physics with the goal of improving process performance.

Solid-Liquid Thermal Energy Storage - Moghtada Mobedi 2022-06-22

Solid–Liquid Thermal Energy Storage: Modeling and Applications provides a comprehensive overview of solid–liquid phase change thermal storage. Chapters are written by specialists from both academia and industry. Using recent studies on the improvement, modeling, and new applications of these systems, the book discusses innovative solutions for any potential drawbacks. This book: Discusses experimental studies in the field of solid–liquid phase change thermal storage Reviews recent research on phase change materials Covers various innovative applications of phase change materials (PCM) on the use of sustainable and renewable energy sources Presents recent developments on the theoretical modeling of these systems Explains advanced methods for enhancement of heat transfer in PCM This book is a reference for engineers and industry professionals involved in the use of renewable energy systems, energy storage, heating systems for buildings, sustainability design, etc. It can also benefit graduate students taking courses in heat transfer, energy engineering, advanced materials, and heating systems.

THERMEC 2018 - R. Shabadi 2018-12-26

This book presents the proceedings of the THERMEC 2018: 10th International Conference on Processing and Manufacturing of Advanced Materials, which took place between July 09 and July 13, 2018 in Paris, France, under the co-sponsorship of Universite de Lille, MINES ParisTech, PSL and

Universite de Tours, France. The presented book will be useful for many researchers and engineers/technologists working in different aspects of processing and fabrication of materials, structure/property evaluation and applications of both ferrous and nonferrous materials including biomaterials, smart materials as well as the advanced measurement techniques in the materials science.

Refining and Casting of Steel - Karel Gryc 2020-11-09

Steel has become the most requested material all over the world during the rapid technological evolution of recent centuries. As our civilization grows and its technological development becomes connected with more demanding processes, it is more and more challenging to fit the required physical and mechanical properties for steel in its huge portfolio of grades for each steel producer. It is necessary to improve the refining and casting processes continuously to meet customer requirements and to lower the production costs to remain competitive. New challenges related to both the precise design of steel properties and reduction in production costs are combined with paying special attention to environmental protection. These contradictory demands are the theme of this book.

Modelling Fluid Flow - J? nos Vad 2013-04-17

Modelling Fluid Flow presents invited lectures, workshop summaries and a selection of papers from a recent international conference CMFF '03 on fluid technology. The lectures follow the current evolution and the newest challenges of the computational methods and measuring techniques related to fluid flow. The workshop summaries reflect the recent trends, open questions and unsolved problems in the mutually inspiring fields of experimental and computational fluid mechanics. The papers cover a wide range of fluids engineering, including reactive flow, chemical and process engineering, environmental fluid dynamics, turbulence modelling, numerical methods, and fluid machinery.

Encyclopedia Of Thermal Packaging, Set 3: Thermal Packaging Applications (A 3-volume Set) - Bar-cohen Avram 2018-10-15

Thermal and mechanical packaging — the enabling technologies for the physical implementation of electronic systems — are responsible for much of the progress in miniaturization, reliability, and functional density achieved by electronic, microelectronic, and nanoelectronic products during the past 50 years. The inherent

inefficiency of electronic devices and their sensitivity to heat have placed thermal packaging on the critical path of nearly every product development effort in traditional, as well as emerging, electronic product categories.Successful thermal packaging is the key differentiator in electronic products, as diverse as supercomputers and cell phones, and continues to be of pivotal importance in the refinement of traditional products and in the development of products for new applications. The Encyclopedia of Thermal Packaging, compiled in four multi-volume sets (Set 1: Thermal Packaging Techniques, Set 2: Thermal Packaging Tools, Set 3: Thermal Packaging Applications, and Set 4: Thermal Packaging Configurations) provides a comprehensive, one-stop treatment of the techniques, tools, applications, and configurations of electronic thermal packaging. Each of the author-written volumes presents the accumulated wisdom and shared perspectives of a few luminaries in the thermal management of electronics.The four sets in the Encyclopedia of Thermal Packaging will provide the novice and student with a complete reference for a quick ascent on the thermal packaging 'learning curve,' the practitioner with a validated set of techniques and tools to face every challenge, and researchers with a clear definition of the state-of-the-art and emerging needs to guide their future efforts. This encyclopedia will, thus, be of great interest to packaging engineers, electronic product development engineers, and product managers, as well as to researchers in thermal management of electronic and photonic components and systems, and most beneficial to undergraduate and graduate students studying mechanical, electrical, and electronic engineering.Set 3: Thermal Packaging ApplicationsThe third set in the Encyclopedia includes two volumes in the planned focus on Thermal Packaging Applications and a single volume on the use of Phase Change Materials (PCM), a most important Thermal Management Technique, not previously addressed in the Encyclopedia. Set 3 opens with Heat Transfer in Avionic Equipment, authored by Dr Boris Abramzon, offering a comprehensive, in-depth treatment of compact heat exchangers and cold plates for avionics cooling, as well as discussion on recent developments in these heat transfer units that are widely used in the thermal control of military and civilian airborne electronics. Along with a detailed presentation of the relevant

thermofluid physics and governing equations, and the supporting mathematical design and optimization techniques, the book offers a practical guide for thermal engineers designing avionics cooling equipment, based on the author's 20+ years of experience as a thermal analyst and a practical design engineer for Avionics and related systems.The Set continues with Thermal Management of RF Systems, which addresses sequentially the history, present practice, and future thermal management strategies for electronically-steered RF systems, in the context of the RF operational requirements, as well as device-, module-, and system-level electronic, thermal, and mechanical considerations. This unique text was written by 3 authors, Dr John D Albrecht, Mr David H Altman, Dr Joseph J Maurer, with extensive US Department of Defense and aerospace industry experience in the design, development, and fielding of RF systems. Their combined efforts have resulted in a text, which is well-grounded in the relevant past, present, and future RF systems and technologies. Thus, this volume will provide the designers of advanced radars and other electronic RF systems with the tools and the knowledge to address the thermal management challenges of today's technologies, as well as of advanced technologies, such as wide bandgap semiconductors, heterogeneously integrated devices, and 3D chipsets and stacks.The third volume in Set 3, Phase Change Materials for Thermal Management of Electronic Components, co-authored by Prof Gennady Ziskind and Dr Yoram Kozak, provides a detailed description of the numerical methods used in PCM analysis and a detailed explanation of the processes that accompany and characterize solid-liquid phase-change in popular basic and advanced geometries. These provide a foundation for an in-depth exploration of specific electronics thermal management applications of Phase Change Materials. This volume is anchored in the unique PCM knowledge and experience of the senior author and placed in the context of the extensive solid-liquid phase-change literature in such diverse fields as material science, mathematical modeling, experimental and numerical methods, and thermofluid science and engineering.

Process Modeling for Steel Industry - Snehanshu Pal 2018-05-22

This book contains a detailed account of modeling aspects of all the relevant concerns of steel industry. The text explores the

Process Modeling Fundamentals, Basic Concepts of Numerical Heat Transfer and Fluid Flow, Fundamentals of Flow Reactors, Numerical Modeling of Different Processes in Steel Industry and Brief Working Guidance for CFD Software Package ANSYS Fluent. Most importantly, this book will help readers to formulate live problem-solving strategy in steel making industry.

Handbook of Porous Media - Kambiz Vafai 2005-03-30

Over the last three decades, advances in modeling flow, heat, and mass transfer through a porous medium have dramatically transformed engineering applications. Comprehensive and cohesive, Handbook of Porous Media, Second Edition presents a compilation of research related to heat and mass transfer including the development of practical applications

Proceedings of the ASME Heat Transfer Division--2005 - 2005

Ultra-High Temperature Thermal Energy Storage, Transfer and Conversion - Alejandro Datas 2020-09-01

Ultra-High Temperature Thermal Energy Storage, Transfer and Conversion presents a comprehensive analysis of thermal energy storage systems operating at beyond 800°C. Editor Dr. Alejandro Datas and his team of expert contributors from a variety of regions summarize the main technological options and the most relevant materials and characterization considerations to enable the reader to make the most effective and efficient decisions.This book helps the reader to solve the very specific challenges associated with working within an ultra-high temperature energy storage setting. It condenses and summarizes the latest knowledge, covering fundamentals, device design, materials selection and applications, as well as thermodynamic cycles and solid-state devices for ultra-high temperature energy conversion.This book provides a comprehensive and multidisciplinary guide to engineers and researchers in a variety of fields including energy conversion, storage, cogeneration, thermodynamics, numerical methods, CSP, and materials engineering. It firstly provides a review of fundamental concepts before exploring numerical methods for fluid-dynamics and phase change materials, before presenting more complex elements such as heat transfer fluids, thermal insulation, thermodynamic cycles, and a variety of energy conversation methods including thermophotovoltaic, thermionic, and combined heat and power. Reviews the main technologies

enabling ultra-high temperature energy storage and conversion, including both thermodynamic cycles and solid-state devices Includes the applications for ultra-high temperature energy storage systems, both in terrestrial and space environments Analyzes the thermophysical properties and relevant experimental and theoretical methods for the analysis of high-temperature materials

Lattice Boltzmann Method - A. A. Mohamad 2019-05-07

This book introduces readers to the lattice Boltzmann method (LBM) for solving transport phenomena – flow, heat and mass transfer – in a systematic way. Providing explanatory computer codes throughout the book, the author guides readers through many practical examples, such as: • flow in isothermal and non-isothermal lid-driven cavities; • flow over obstacles; • forced flow through a heated channel; • conjugate forced convection; and • natural convection. Diffusion and advection–diffusion equations are discussed, together with applications and examples, and complete computer codes accompany the sections on single and multi-relaxation-time methods. The codes are written in MatLab. However, the codes are written in a way that can be easily converted to other languages, such as FORTRANm Python, Julia, etc. The codes can also be extended with little effort to multi-phase and multi-physics, provided the physics of the respective problem are known. The second edition of this book adds new chapters, and includes new theory and applications. It discusses a wealth of practical examples, and explains LBM in connection with various engineering topics, especially the transport of mass, momentum, energy and molecular species. This book offers a useful and easy-to-follow guide for readers with some prior experience with advanced mathematics and physics, and will be of interest to all researchers and other readers who wish to learn how to apply LBM to engineering and industrial problems. It can also be used as a textbook for advanced undergraduate or graduate courses on computational transport phenomena

Fire and Buildings - T. T. Lie 1972

Dynamic Risk Analysis in the Chemical and Petroleum Industry - Nicola Paltrinieri 2016-08-06

Dynamic Risk Analysis in the Chemical and Petroleum Industry focuses on bridging the gap between research and industry by responding to the following questions: What are the most relevant developments of risk

analysis? How can these studies help industry in the prevention of major accidents? Paltrinieri and Khan provide support for professionals who plan to improve risk analysis by introducing innovative techniques and exploiting the potential of data share and process technologies. This concrete reference within an ever-growing variety of innovations will be most helpful to process safety managers, HSE managers, safety engineers and safety engineering students. This book is divided into four parts. The Introduction provides an overview of the state-of-the-art risk analysis methods and the most up-to-date popular definitions of accident scenarios. The second section on Dynamic Risk Analysis shows the dynamic evolution of risk analysis and covers Hazard Identification, Frequency Analysis, Consequence Analysis and Establishing the Risk Picture. The third section on Interaction with Parallel Disciplines illustrates the interaction between risk analysis and other disciplines from parallel fields, such as the nuclear, the economic and the financial sectors. The final section on Dynamic Risk Management addresses risk management, which may dynamically learn from itself and improve in a spiral process leading to a resilient system. Helps dynamic analysis and management of risk in chemical and process industry Provides industry examples and techniques to assist you with risk- based decision making Addresses also the human, economic and reputational aspects composing the overall risk picture

Recent Advances in Thermofluids and Manufacturing Engineering - Shripad Revankar 2022-09-30

This book presents the select proceedings of the International Conference on Thermofluids and Manufacturing Science (ICTMS 2022). Some of the topics covered include Heat transfer, fluid dynamics, multiphase flow, flow diagnostics using artificial neural network, aerodynamics, high-speed flows, sustainable energy technology, propulsion and emissions, Eco-friendly manufacturing, Coating Techniques and Supply chain management etc. Given the scope, the book will be highly useful for researchers and professionals interested in mechanical, production or aerospace engineering

Fire Properties of Polymer Composite Materials - A. P. Mouritz 2007-01-30

This book is the first to deal with the important topic of the fire behaviour of fibre reinforced polymer composite materials. The book covers all of the key issues on the behaviour of composites in a fire. Also covered are fire

protection materials for composites, fire properties of nanocomposites, fire safety regulations and standards, fire test methods, and health hazards from burning composites.

Heterogeneous Photocatalysis - Giuseppe Marcì 2019-02-21

Heterogeneous Photocatalysis: Relationships with Heterogeneous Catalysis and Perspectives highlights the differences between thermal-catalysis and photo-catalysis and indicates borderlines, in particular, the possible synergism between them. The book outlines the basic aspect of thermal- and photo-catalysis, along with the most important characterization techniques. In addition, it presents case studies of thermal-catalytic and photo-catalytic or thermal-photo-catalytic reactions and includes a comparison between the results obtained using an inorganic solid as thermal catalyst and photocatalyst for the same reaction, and in the same setup. Final sections offer information on the preparation methods of (photo)catalysts, various techniques used for their characterization, engineering and economical aspects. This book will be a valuable reference source for students and researchers involved in heterogeneous photocatalysis and catalysis, chemistry, chemical engineering, materials science, materials engineering, environment engineering, nanotechnology and green chemistry. Provides selective methods for the preparation of microcrystalline/nanocrystalline solids or films used in catalytic and photocatalytic processes Describes (photo)reactions that can be carried out catalytically and/or photocatalytically Outlines the different mechanisms, yields and experimental conditions under which photocatalytic reactions can take place Describes various (photo)reactors and set ups under which the photacatalytic reactions can be carried out Provides an economic assessment to understand the feasibility of some photocatalytic reactions

Advances in Mechanical and Materials Technology - Kannan Govindan 2022-01-01

This book presents select papers from the International Conference on Energy, Material Sciences and Mechanical Engineering (EMSME) - 2020. The book covers the three core areas of energy, material sciences and mechanical engineering. The topics covered include non-conventional energy resources, energy harvesting, polymers, composites, 2D materials, systems engineering, materials engineering, micro-machining, renewable energy, industrial engineering and additive manufacturing. This book will be

useful to researchers and professionals working in the areas of mechanical and industrial engineering, materials applications, and energy technology.

Heat Conduction - David W. Hahn 2012-08-20

The long-awaited revision of the bestseller on heat conduction Heat Conduction, Third Edition is an update of the classic text on heat conduction, replacing some of the coverage of numerical methods with content on micro- and nanoscale heat transfer. With an emphasis on the mathematics and underlying physics, this new edition has considerable depth and analytical rigor, providing a systematic framework for each solution scheme with attention to boundary conditions and energy conservation. Chapter coverage includes: Heat conduction fundamentals Orthogonal functions, boundary value problems, and the Fourier Series The separation of variables in the rectangular coordinate system The separation of variables in the cylindrical coordinate system The separation of variables in the spherical coordinate system Solution of the heat equation for semi-infinite and infinite domains The use of Duhamel's theorem The use of Green's function for solution of heat conduction The use of the Laplace transform One-dimensional composite medium Moving heat source problems Phase-change problems Approximate analytic methods Integral-transform technique Heat conduction in anisotropic solids Introduction to microscale heat conduction In addition, new capstone examples are included in this edition and extensive problems, cases, and examples have been thoroughly updated. A solutions manual is also available. Heat Conduction is appropriate reading for students in mainstream courses of conduction heat transfer, students in mechanical engineering, and engineers in research and design functions throughout industry.

Jo? ef Stefan: His Scientific Legacy on the 175th Anniversary of His Birth - John C. Crepeau 2013-02-20

Most scientists and engineers are familiar with the name Josef Stefan primarily from the Stefan-Boltzmann law, which relates the amount of energy transferred by radiation to the absolute temperature raised to the fourth power. Stefan determined this law from experimental data, and it was later theoretically verified by his former student, Ludwig Boltzmann. However, it is interesting to know that this is the same Stefan who lent his name to the solid-liquid phase change problem, and concepts related to molecular diffusion and convective motion driven by surface evaporation or ablation.

Stefan counted among his students Sigmund Freud, who was so inspired by his physics instructor that he incorporated scientific methods into psychoanalysis. This invaluable book details not only Josef Stefan's original contributions in these areas, but the current state-of-the-art of his pioneering work.