

**Heat and
Mass Transfer**

M. Sommerfeld

Bubbly Flows

Analysis, Modelling and Calculation



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Bubbly Flows Analysis Modelling And Calculation Heat And Mass Transfer:

Bubbly Flows Martin Sommerfeld, 2003-10-08 The book summarises the outcome of a priority research programme Analysis Modelling and Computation of Multiphase Flows The results of 24 individual research projects are presented The main objective of the research programme was to provide a better understanding of the physical basis for multiphase gas liquid flows as they are found in numerous chemical and biochemical reactors The research comprises steady and unsteady multiphase flows in three frequently found reactor configurations namely bubble columns without internals airlift loop reactors and aerated stirred vessels For this purpose new and improved measurement techniques were developed From the resulting knowledge and data new and refined models for describing the underlying physical processes were developed which were used for the establishment and improvement of analytic as well as numerical methods for predicting multiphase reactors Thereby the development layout and scale up of such processes should be possible on a more reliable basis

Numerical Methods for Two-phase Incompressible Flows Sven Gross, Arnold Reusken, 2011-04-26 This book is the first monograph providing an introduction to and an overview of numerical methods for the simulation of two phase incompressible flows The Navier Stokes equations describing the fluid dynamics are examined in combination with models for mass and surfactant transport The book pursues a comprehensive approach important modeling issues are treated appropriate weak formulations are derived level set and finite element discretization techniques are analyzed efficient iterative solvers are investigated implementational aspects are considered and the results of numerical experiments are presented The book is aimed at M Sc and PhD students and other researchers in the fields of Numerical Analysis and Computational Engineering Science interested in the numerical treatment of two phase incompressible flows Transport Processes at Fluidic Interfaces Dieter Bothe, Arnold Reusken, 2017-07-13 There are several physico chemical processes that determine the behavior of multiphase fluid systems e g the fluid dynamics in the different phases and the dynamics of the interface s mass transport between the fluids adsorption effects at the interface and transport of surfactants on the interface and result in heterogeneous interface properties In general these processes are strongly coupled and local properties of the interface play a crucial role A thorough understanding of the behavior of such complex flow problems must be based on physically sound mathematical models which especially account for the local processes at the interface This book presents recent findings on the rigorous derivation and mathematical analysis of such models and on the development of numerical methods for direct numerical simulations Validation results are based on specifically designed experiments using high resolution experimental techniques A special feature of this book is its focus on an interdisciplinary research approach combining Applied Analysis Numerical Mathematics Interface Physics and Chemistry as well as relevant research areas in the Engineering Sciences The contributions originated from the joint interdisciplinary research projects in the DFG Priority Programme SPP 1506 Transport Processes at Fluidic Interfaces Multiphase Flow Analysis Using Population Balance

Modeling Guan Heng Yeoh, Dr. Chi Pok Cheung, Jiyuan Tu, 2013-08-19 Written by leading multiphase flow and CFD experts this book enables engineers and researchers to understand the use of PBM and CFD frameworks Population balance approaches can now be used in conjunction with CFD effectively driving more efficient and effective multiphase flow processes Engineers familiar with standard CFD software including ANSYS CFX and ANSYS Fluent will be able to use the tools and approaches presented in this book in the effective research modeling and control of multiphase flow problems Builds a complete understanding of the theory behind the application of population balance models and an appreciation of the scale up of computational fluid dynamics CFD and population balance modeling PBM to a variety of engineering and industry applications in chemical pharmaceutical energy and petrochemical sectors The tools in this book provide the opportunity to incorporate more accurate models in the design of chemical and particulate based multiphase processes Enables readers to translate theory to practical use with CFD software

Nuclear Power Plant Design and Analysis

Codes Jun Wang, Xin Li, Chris Allison, Judy Hohorst, 2020-11-10 Nuclear Power Plant Design and Analysis Codes Development Validation and Application presents the latest research on the most widely used nuclear codes and the wealth of successful accomplishments which have been achieved over the past decades by experts in the field Editors Wang Li Allison and Hohorst and their team of authors provide readers with a comprehensive understanding of nuclear code development and how to apply it to their work and research to make their energy production more flexible economical reliable and safe Written in an accessible and practical way each chapter considers strengths and limitations data availability needs verification and validation methodologies and quality assurance guidelines to develop thorough and robust models and simulation tools both inside and outside a nuclear setting This book benefits those working in nuclear reactor physics and thermal hydraulics as well as those involved in nuclear reactor licensing It also provides early career researchers with a solid understanding of fundamental knowledge of mainstream nuclear modelling codes as well as the more experienced engineers seeking advanced information on the best solutions to suit their needs Captures important research conducted over last few decades by experts and allows new researchers and professionals to learn from the work of their predecessors Presents the most recent updates and developments including the capabilities limitations and future development needs of all codes Includes applications for each code to ensure readers have complete knowledge to apply to their own setting

Multiphase reacting flows: modelling and simulation Daniele L. Marchisio, Rodney O. Fox, 2007-10-16 This book entitled Multiphase reacting flows modelling and simulation contains the lecture notes of the CISM International Centre for Mechanical Sciences course held in Udine Italy on July 3 7 2006 and it describes various modelling approaches for dealing with polydisperse multiphase reacting flows A multiphase reacting system is characterized by the presence of multiple phases and in this book we focus on disperse multiphase systems where one phase can be considered as a continuum whereas the additional phases are dispersed in the continuous one In other words in this book we deal with multiphase systems constituted by particles

droplets or bubbles i.e solid particles suspended in a continuous liquid phase liquid droplets in a gaseous phase or gas bubbles in liquid The other important characteristic elements of the systems discussed in this book are the presence of one or more chemical reactions and the turbulent nature of the flow The chemical reactions usually involve all the phases present in the system and might be responsible for the formation or disappearance of the disperse and or continuous phases The evolution of the different phases is not only governed by chemical reactions but also by other fluid dynamical interactions between the continuous and the disperse phases and by interactions among elements of the disperse phases such as coalescence aggregation agglomeration and break up

Computational Fluid Dynamics in Fire Engineering Guan Heng Yeoh, Kwok Kit Yuen, 2009-04-20 Fire and combustion presents a significant engineering challenge to mechanical civil and dedicated fire engineers as well as specialists in the process and chemical safety buildings and structural fields We are reminded of the tragic outcomes of untenable fire disasters such as at King's Cross underground station or Switzerland's St Gotthard tunnel In these and many other cases computational fluid dynamics CFD is at the forefront of active research into unravelling the probable causes of fires and helping to design structures and systems to ensure that they are less likely in the future Computational fluid dynamics CFD is routinely used as an analysis tool in fire and combustion engineering as it possesses the ability to handle the complex geometries and characteristics of combustion and fire This book shows engineering students and professionals how to understand and use this powerful tool in the study of combustion processes and in the engineering of safer or more fire resistant or conversely more fire efficient structures No other book is dedicated to computer based fire dynamics tools and systems It is supported by a rigorous pedagogy including worked examples to illustrate the capabilities of different models an introduction to the essential aspects of fire physics examination and self test exercises fully worked solutions and a suite of accompanying software for use in industry standard modeling systems Computational Fluid Dynamics CFD is widely used in engineering analysis this is the only book dedicated to CFD modeling analysis in fire and combustion engineering Strong pedagogic features mean this book can be used as a text for graduate level mechanical civil structural and fire engineering courses while its coverage of the latest techniques and industry standard software make it an important reference for researchers and professional engineers in the mechanical and structural sectors and by fire engineers safety consultants and regulators Strong author team CUHK is a recognized centre of excellence in fire eng deliver an expert package for students and professionals showing both theory and applications Accompanied by CFD modeling code and ready to use simulations to run in industry standard ANSYS CFX and Fluent software

Applied mechanics reviews, 1948 Hydraulic Research in the United States and Canada United States. National Bureau of Standards, 1978

CO2 Refrigeration Cycle and Systems Xin-Rong Zhang, Trygve Magne Eikevik, 2023-05-05 This book covers the fundamentals and applications of carbon dioxide vapor compression refrigeration thermodynamic cycles In particular it presents new application areas such as making ice and snow in the Winter Olympic

Games food cooling and refrigeration The book explores the physical and chemical characteristics of CO₂ fluid and the unique traits of its thermodynamic cycle The contributors explain how CO₂ refrigeration is a developing eco friendly technology and emphasize its importance for refrigeration and air conditioning in the current and future market This book is a valuable source of information for researchers engineers and policy makers looking to expand their applicable knowledge of high potential refrigeration technology using carbon dioxide It is also of interest to postgraduate students and practitioners looking for an academic insight into the industry s latest eco friendly technologies

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