

**Heat and
Mass Transfer**

M. Sommerfeld

Bubbly Flows

Analysis, Modelling and Calculation



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Reactive Bubbly Flows Michael Schlüter, Dieter Bothe, Sonja Herres-Pawlis, Ulrich Niekens, 2021-07-29 This book presents experimental and numerical methods that have been developed during six years of targeted research within the DFG priority program SPP 1740 elucidating the interaction between hydrodynamics mass transfer and transport as well as chemical reactions in bubbly flows A special feature of this book is its focus on an interdisciplinary research approach with contributions from chemistry mathematics and engineering sciences providing enhanced or novel experimental methods models and numerical simulations This book provides fundamental knowledge to students about the current state of knowledge regarding transport processes in reactive bubbly flows as well as to scientists emphasizing pressing research questions and further current demands for fundamental research Engineers from the chemical industries will get valuable insights into relevant gas liquid processes and benefit from recommendations concerning the design of gas liquid reactors and laboratory experiments for studying the performance of gas liquid reactions in their own lab *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 *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 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 *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 ,1972

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