

1. Record Nr.	UNINA9910815238303321
Titolo	Gasification processes : modeling and simulation // edited by Petr A. Nikrityuk and Bernd Meyer
Pubbl/distr/stampa	Weinheim, Germany : , : Wiley-VCH, , 2014 ©2014
ISBN	3-527-67320-2 3-527-67318-0 3-527-67321-0
Descrizione fisica	1 online resource (362 p.)
Disciplina	665.772
Soggetti	Coal gasification - Social aspects Coal gasification - Environmental aspects Gas industry - Social aspects
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Gasification Processes; Contents; Preface; List of Contributors; Acknowledgments; Recommended Reading; Coal Gasification: Basic Terminology; Chapter 1 Modeling of Gasifiers: Overview of Current Developments; 1.1 Numerical Modeling in Engineering; 1.1.1 The Role of Direct Numerical Simulation (DNS) in Particulate-Flow Modeling; Summary; 1.2 CFD-based Modeling of Entrained-Flow Gasifiers; 1.2.1 Mainstream Computational Submodels; 1.2.1.1 Particle Conversion; 1.2.1.2 Turbulence-Chemistry Interaction; 1.2.2 Review of CFD-related Works; 1.2.2.1 Noncommercial Software; 1.2.2.2 Commercial Software Summary; 1.3 Benchmark Tests for CFD Modeling; 1.3.1 British Coal Utilization Research Association Reactor (BCURA); 1.3.2 Brigham Young University Reactor (BYU); 1.3.3 Pressurized Entrained-Flow Reactor (PEFR); References; Chapter 2 Gasification of Solids: Past, Present, and Future; 2.1 Introduction; 2.2 Historical Background; 2.3 Types of Gasification Reactors; 2.4 Trends in Gasifier Development; 2.5 Derived Challenges for Research; References; Chapter 3 Modeling of Moving Particles: Review of Basic Concepts and Models; 3.1 Introduction; 3.2

Soft-Sphere Model; 3.2.1 Numerical Implementation
3.2.1.1 Contact Forces; 3.2.1.2 Collision Parameters; 3.2.1.3 Contact Detection; 3.2.1.4 Time Integration; 3.2.2 Validation Cases; 3.2.2.1 Free-Falling Particle; 3.2.2.2 Analytic Solution for the Free-falling Particle; 3.2.2.3 Slipping Sphere on a Rough Surface; 3.2.3 Illustrative Examples; 3.2.3.1 Breaking Dam Problem; 3.2.3.2 Rotating Drum; 3.2.3.3 Generation of Fixed Beds; 3.3 Hard-Sphere Model; 3.3.1 Governing Equations; 3.3.2 Collision Treatment in Dense Particulate Systems; 3.3.3 2D Formulation of Hard-Sphere Collisions; 3.3.4 Illustration of Hard-Sphere Models; 3.3.5 Conclusions
Nomenclature; References; Chapter 4 CD and Nu Closure Relations for Spherical and NonSpherical Particles; 4.1 Literature Review; 4.2 Model Description; 4.2.1 Numerical Scheme and Discretization; 4.3 Code and Software Validation; 4.4 Porous Particles; 4.4.1 Geometry Assumptions; 4.4.2 Heat and Fluid Flow Past Porous Particles; 4.4.3 Drag and Nusselt Numbers for Porous Particles; 4.5 Nonspherical Particles; 4.5.1 Heat and Fluid Flow of Particles Oriented in the Flow Direction; 4.5.2 Flow Characteristics of Particles at Different Angles of Attack
4.5.3 Influence of Particle Orientation on Drag Forces and Heat Transfer; 4.5.3.1 Drag Forces; 4.5.3.2 Heat Transfer; 4.5.3.3 Drag Forces and Nusselt Relations for Two Rotations; 4.5.4 Discussion; 4.5.5 Conclusion; References; Chapter 5 Single Particle Heating and Drying; 5.1 Nonporous Spherical Particle Heating in a Stream of Hot Air; 5.1.1 State of the Art; 5.1.2 Problem and Model Formulation; 5.1.2.1 Linear Model; 5.1.3 Illustration of Results and Subgrid Model; 5.1.4 Semiempirical Two-Temperature Subgrid Model; 5.2 Heating of a Porous Particle; 5.2.1 Problem and Model Formulation
5.2.2 Porosity

Sommario/riassunto

Bridging the gap between the well-known technological description of gasification and the underlying theoretical understanding, this book covers the latest numerical and semi-empirical models describing interphase phenomena in high-temperature conversion processes. Consequently, it focuses on the description of gas-particle reaction systems by state-of-the-art computational models in an integrated, unified form. Special attention is paid to understanding and modeling the interaction between individual coal particles and a surrounding hot gas, including heterogeneous and homogeneous chemical re
