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Nota di contenuto	Cover; Title page; Copyright page; Contents; Preface; About the Authors; Chapter 1 - Introduction; Chapter 2 - Fluid flow and mass transfer on particle scale; 2.1 - Introduction; 2.2 - Theoretical basis; 2.2.1 - Fluid mechanics; 2.2.2 - Mass transfer; 2.2.3 - Interfacial force balance; 2.2.4 - Interfacial mass transport; 2.3 - Numerical methods; 2.3.1 - Orthogonal boundary-fitted coordinate system; 2.3.1.1 - Stream function-vorticity formulation; 2.3.1.2 - Convective transport equation; 2.3.1.3 - Numerical solution procedure; 2.3.2 - Level set method; 2.3.2.1 - Level set method for fluid flow 2.3.2.2 - Level set method for mass transfer 2.3.2.3 - Numerical solution procedure; 2.3.3 - Mirror fluid method; 2.4 - Buoyancy-driven motion and mass transfer of a single particle; 2.4.1 - Drop, bubble and solid particle motion; 2.4.1.1 - Bubble/drop formation; 2.4.1.2 - Unsteady and steady motion; 2.4.1.3 - Coalescence; 2.4.1.4 - Bubbles and drops in a non-Newtonian fluid; 2.4.1.5 - Simulation of solid particle motion by the mirror fluid method; 2.4.2 - Mass transfer to/from a drop; 2.5 - Mass transfer-induced Marangoni effect; 2.5.1 - Solute-induced Marangoni effect 2.5.2 - Effect of surfactant on drop motion and mass transfer 2.5.2.1 - Formulation; 2.5.2.2 - Effect of surfactant on drop motion; 2.5.2.3 - Effect of surfactant on mass transfer; 2.5.2.3.1 - Hydrodynamic effect

on transient mass transfer; 2.5.2.3.2 - Effect of interfacial resistance on transient mass transfer; 2.5.3 - Surfactant-induced Marangoni effect; 2.6 - Behavior of particle swarms; 2.6.1 - Introduction; 2.6.2 - Forces on single particles; 2.6.2.1 - Drag force; 2.6.2.2 - Unsteady forces; 2.6.2.3 - Lift force; 2.6.3 - Cell model; 2.7 - Single particles in shear flow and extensional flow
2.7.1 - Mass/heat transfer from a spherical particle in extensional flow
2.7.1.1 - Steady transport; 2.7.1.2 - Unsteady transport; 2.7.2 - Flow and transport from a sphere in simple shear flow; 2.7.2.1 - Flow field; 2.7.2.2 - Mass/heat transfer; 2.8 - Summary and perspective; 2.8.1 - Summary; 2.8.2 - Perspective; Nomenclature; References; Chapter 3 - Multiphase stirred reactors; 3.1 - Introduction; 3.2 - Mathematical models and numerical methods; 3.2.1 - Governing equations; 3.2.2 - Interphase momentum exchange; 3.2.3 - RANS method; 3.2.3.1 - k- model; 3.2.3.2 - EASM; 3.2.4 - LES model
3.2.5 - Impeller treatment
3.2.5.1 - "Black box" model; 3.2.5.2 - Snapshot method; 3.2.5.3 - Inner-outer iteration (IO); 3.2.5.4 - Multiple reference frame (MRF); 3.2.5.5 - Sliding mesh (SM); 3.2.5.6 - Methods to deal with axial flow impellers; Vector distance method; Mirror fluid method (MFM); 3.2.6 - Numerical details; 3.2.6.1 - Discretization of partial differential equations; 3.2.6.2 - Boundary conditions; 3.3 - Two-phase flow in stirred tanks; 3.3.1 - Solid-liquid systems; 3.3.1.1 - Suspension of solid particles; 3.3.1.2 - Flow field
3.3.1.3 - Distribution of solid particles and cloud height

Sommario/riassunto

Numerical simulation of multiphase reactors with continuous liquid phase provides current research and findings in multiphase problems, which will assist researchers and engineers to advance this field. This is an ideal reference book for readers who are interested in design and scale-up of multiphase reactors and crystallizers, and using mathematical model and numerical simulation as tools. Yang and Mao's book focuses on modeling and numerical applications directly in the chemical, petrochemical, and hydrometallurgical industries, rather than theories of multiphase flow. The content will
