1. Record Nr. UNINA9910299816803321

Autore	Mauri Roberto
Titolo	Transport Phenomena in Multiphase Flows / / by Roberto Mauri
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2015
ISBN	3-319-15793-0
Edizione	[1st ed. 2015.]
Descrizione fisica	1 online resource (XV, 459 p. 156 illus.)
Collana	Fluid Mechanics and Its Applications, , 0926-5112 ; ; 112
Disciplina	530.138
Soggetti	Thermodynamics Heat engineering Heat - Transmission Mass transfer Fluids Chemical engineering Biomedical engineering Engineering Thermodynamics, Heat and Mass Transfer Fluid- and Aerodynamics Industrial Chemistry/Chemical Engineering Biomedical Engineering and Bioengineering
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Includes index.
Nota di contenuto	Preface -- Thermodynamics and Evolution -- Statics of Fluids -- General Features of Fluid Mechanics -- Macroscopic Balances -- Laminar Flow Fields -- The Governing Equations of a Simple Fluid -- Unidirectional Flows -- Laminar Boundary Layer -- Heat Conduction -- Conduction with Heat Sources -- Macroscopic Energy Balance -- Time Dependent Heat Conduction -- Convective Heat Transport -- Constitutive Equations for Transport of Chemical Species -- Stationary Material Transport -- Non Stationary Material Transport -- Convective Material Transport -- Transport Phenomena in Turbulent Flow.- Free Convection -- Radiant Heat Transfer -- Anti diffusion -- Stationary Diffusion.- Appendices A – F -- Solutions of Problems - Background Reading -- Subject Index.

Sommario/riassunto

This textbook provides a thorough presentation of the phenomena related to the transport of mass, momentum and energy. It lays all the basic physical principles, then for the more advanced readers, it offers an in-depth treatment with advanced mathematical derivations and ends with some useful applications of the models and equations in specific settings. The important idea behind the book is to unify all types of transport phenomena, describing them within a common framework in terms of cause and effect, respectively represented by the driving force and the flux of the transported quantity. The approach and presentation are original in that the book starts with a general description of transport processes, providing the macroscopic balance relations of fluid dynamics and heat and mass transfer, before diving into the mathematical realm of continuum mechanics to derive the microscopic governing equations at the microscopic level. The book is a modular teaching tool and can be used either for an introductory or for an advanced graduate course. The last 6 chapters will be of interest to more advanced researchers who might be interested in particular applications in physics, mechanical engineering or biomedical engineering. All chapters are complemented with exercises that are essential to complete the learning process.