1. Record Nr. UNINA9910484019903321

Autore	Cossali Gianpietro Elvio
Titolo	Drop Heating and Evaporation: Analytical Solutions in Curvilinear Coordinate Systems / / by Gianpietro Elvio Cossali, Simona Tonini
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2021
ISBN	3-030-49274-5
Edizione	[1st ed. 2021.]
Descrizione fisica	1 online resource (xi, 399 pages)
Collana	Mathematical Engineering, , 2192-4732
Disciplina	530.427 536.44
Soggetti	Fluid mechanics Engineering mathematics Computer mathematics Mathematical models Differential geometry Engineering Fluid Dynamics Engineering Mathematics Computational Science and Engineering Mathematical Modeling and Industrial Mathematics Differential Geometry
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Part I: Mathematical tools -- Introduction to tensor analysis -- Elements of dierential geometry of a surface -- Separability of PDE -- Orthogonal curvilinear coordinate systems -- Sturm-Liouville problems -- Part II: Mass, momentum and energy conservation equations in curvilinear coordinates -- Conservation equations. .
Sommario/riassunto	This book describes analytical methods for modelling drop evaporation, providing the mathematical tools needed in order to generalise transport and constitutive equations and to find analytical solutions in curvilinear coordinate systems. Transport phenomena in gas mixtures are treated in considerable detail, and the basics of differential geometry are introduced in order to describe interface-related

transport phenomena. One chapter is solely devoted to the description of sixteen different orthogonal curvilinear coordinate systems, reporting explicitly on the forms of their differential operators (gradient, divergent, curl, Laplacian) and transformation matrices. The book is intended to guide the reader from mathematics, to physical descriptions, and ultimately to engineering applications, in order to demonstrate the effectiveness of applied mathematics when properly adapted to the real world. Though the book primarily addresses the needs of engineering researchers, it will also benefit graduate students.