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   Nota di contenuto Computational Thermo-Fluid Dynamics; Contents; Preface; Acknowledgments; 1 Introduction; 1.1 Heat and Fluid Flows in Materials Science and Engineering; 1.2 Overview of the Present Work; 2 Mathematical Description of Physical Phenomena in Thermofluid Dynamics; 2.1 Conservation Equations for Continuum Media; 2.1.1 Conservation of Mass; 2.1.2 Conservation of Momentum; 2.1.3 Energy Conservation Equation; 2.1.4 Conservation of Chemical Species; 2.1.5 Boussinesq Approximation; 2.1.6 Unified Form of Conservation Equations; 2.1.7 Nondimensional Form of Conservation Equations; 2.1.8 Short Summary
   2.2 Boundary and Initial Conditions2.2.1 Heat Transfer; 2.2.2 Solutal Transfer; 2.2.3 Fluid Dynamics; 2.3 Conservation Equations in Electromagnetics; 2.3.1 Maxwell Equations; 2.3.2 Induction and Poisson Equations; 2.3.3 An Example of a Low Magnetic Reynolds Number

Sommario/riassunto	Combining previously unconnected computational methods, this monograph discusses the latest basic schemes and algorithms for the solution of fluid, heat and mass transfer problems coupled with electrodynamics. It presents the necessary mathematical background of computational thermo-fluid dynamics, the numerical implementation and the application to real-world problems. Particular emphasis is placed throughout on the use of electromagnetic fields to control the heat, mass and fluid flows in melts and on phase change phenomena during the solidification of pure materials and binary alloys. Howev