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Descrizione fisica	1 online resource (496 p.)
Collana	IEEE press series on rf and microwave technology IEEE series on RF and microwave technology
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Soggetti	Plasma dynamics Electromagnetism Aerodynamics
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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Plasma Fundamentals -- Ionization Processes -- Magnetohydrodynamics Formulation -- Computational Electromagnetics -- Electromagnetic Wave Propagation and Scattering -- Computational Fluid Dynamics -- Computational Electromagnetic-Aerodynamics -- Modeling Electron Impact Ionization -- Joule-Heating Actuators -- Lorentz-Force Actuator -- Plasma Fundamentals.
Sommario/riassunto	Presents numerical algorithms, procedures, and techniques required to solve engineering problems relating to the interactions between electromagnetic fields, fluid flow, and interdisciplinary technology for aerodynamics, electromagnetics, chemical-physics kinetics, and plasmadynamics This book addresses modeling and simulation science and technology for studying ionized gas phenomena in engineering applications. Computational Electromagnetic-Aerodynamics is organized into ten chapters. Chapter one to three introduce the fundamental concepts of plasmadynamics, chemical-physics of ionization, classical magnetohydrodynamics, and their extensions to plasma-based flow control actuators, high-speed flows of interplanetary re-entry, and ion thrusters in space exploration. Chapter

four to six explain numerical algorithms and procedures for solving Maxwell's equation in the time domain for computational electromagnetics, plasma wave propagation, and the time-dependent compressible Navier-Stokes equation for aerodynamics. The concluding chapters discuss developments in computational electromagnetic-aerodynamics for multi-fluid models, including chemical kinetics by nonequilibrium thermal excitations, and chemical-physics by electron impact ionization. . Integrates interlinking computational model and simulation techniques of aerodynamics and electromagnetics. Combines classic plasma drift-diffusion theory and electron impact ionization modeling for electromagnetic-aerodynamic interactions. Describes models of internal degrees of freedom for vibration relaxation and electron excitations This book is intended for aerospace researcher and engineers, as well as graduate students in preparation for thesis and dissertation research. Joseph Shang is a Research Professor Emeritus at Wright State University, USA, and a Scientist Emeritus at the Air Force Research Laboratory. He received his PhD in Aerospace Engineering from Ohio State University. Dr. Shang is a pioneer of Computational Fluid Dynamics (CFD) and Computational Electromagnetics (CEM), and led the development of three-dimensional, mass-averaged Navier-Stokes equations simulations for the aerodynamic performance of aerospace vehicles as well as the characteristic-based formulation for solving three-dimensional Maxwell equations in the time domain. He is a fellow of the American Institute of Aeronauts and Astronautics, and serves on the advisory board of the Aerospace Engineering Department. He has written nearly 400 articles and conference papers, as well as 14 book chapters.