



RAREFIED GAS DYNAMICS 'FUNDAMENTALS, SIMULATIONS AND MICRO FLOWS

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This book elucidates the methods of molecular gas dynamics or rarefied gas dynamics which treat the problems of gas flows when the discrete molecular effects of the gas prevail under the circumstances of low density, the emphases being stressed on the basis of the methods, the direct simulation Monte Carlo method applied to the simulation of non-equilibrium effects and the frontier subjects related to low speed microscale rarefied gas flows. It provides a solid basis for the study of molecular gas dynamics for senior students and graduates in the aerospace and mechanical engineering departments of universities and colleges. It gives a general acquaintance of modern developments of rarefied gas dynamics in various regimes and leads to the frontier topics of non-equilibrium rarefied gas dynamics and low speed microscale gas dynamics. It will be also of benefit to the scientific and technical researchers engaged in aerospace high altitude aerodynamic force and heating design and in the research on gas flow in MEMS.

Written for Researchers and advanced students in mechanical engineering and applied physics

Keywords aerodynamics, fluid flow, Kinetic theory, microchannels, microfluidics, molecules

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UNIFIED STRENGTH THEORY AND ITS APPLICATION

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Abstract This book provides a new Unified Strength Theory and describes its applications. The Unified Strength Theory is a system of yield and failure criteria of materials under complex stresses. It covers the entire range of convex failure criteria, from lower bound (Tresca yield criteria and Mohr-Coulomb failure criteria) to upper bound (twin-shear failure criteria). It also includes the non-convex yield and non-convex failure criteria. A series of new failure criteria and previous failure and yield criteria can be deduced from the Unified Strength Theory. The work presented in this book is unprecedented in the field of strength theory. It is useful for students in understanding the strength theory, for engineers to correctly use it and for researchers to choose an appropriate failure criteria in studying the strength of materials and structures. An experimental verification, engineering applications, a detailed historical review and more than 1000 references are provided.

Written for Researchers in applied mechanics and materials science

Keywords strength of materials, damage mechanics, fatigue, materials mechanics, mechanical stress, plasticity, structures, yield criterion

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