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Autore	Rathakrishnan Ethirajan
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Theory of Gases; 4.11 Collision Frequency and Mean Free Path; 4.12 Velocity and Speed Distribution Functions; 4.13 Inviscid High-Temperature Equilibrium Flows; 4.14 Governing Equations; 4.15 Normal and Oblique Shocks; 4.16 Oblique Shock Wave in an Equilibrium Gas; 4.17 Equilibrium Quasi-One-Dimensional Nozzle Flows; 4.18 Frozen and Equilibrium Flows; 4.19 Equilibrium and Frozen Specific Heats; 4.20 Inviscid High-Temperature Nonequilibrium Flows 4.21 Nonequilibrium Normal Shock and Oblique Shock Flows 4.22 Nonequilibrium Flow over Blunt-Nosed Bodies; 4.23 Transport Properties in High-Temperature Gases; 4.24 Summary; Exercise Problems; References; Chapter 5: Hypersonic Flows; 5.1 Introduction; 5.2 Newtonian Flow Model; 5.3 Mach Number Independence Principle; 5.4 Hypersonic Flow Characteristics; 5.5 Governing Equations; 5.6 Dependent Variables; 5.7 Transport Properties; 5.8 Continuity Equation; 5.9 Momentum Equation; 5.10 Energy Equation; 5.11 General Form of the Equations of Motion; 5.12 Experimental Measurements of Hypersonic Flows 5.13 Measurements of Hypersonic Flows 5.14 Summary; Exercise Problems; References; Chapter 6: Aerothermodynamics; 6.1 Introduction; 6.2 Empirical Correlations; 6.3 Viscous Interaction with External Flow; 6.4 CFD for Hypersonic Flows; 6.5 Computation Based on a Two-layer Flow Model; 6.6 Calibration and Validation of the CFD Codes; 6.7 Basic CFD-Intuitive Understanding; 6.8 Summary; Exercise Problem; References; Chapter 7: High-Enthalpy Facilities; 7.1 Introduction; 7.2 Hotshot Tunnels; 7.3 Plasma Arc Tunnels; 7.4 Shock Tubes; 7.5 Shock Tunnels; 7.6 Gun Tunnels 7.7 Some of the Working Facilities

Sommario/riassunto

This is an introductory level textbook which explains the elements of high temperature and high-speed gas dynamics. Readers will gain an understanding how the thermodynamic and transport properties of high temperature gas are determined from a microscopic viewpoint of the molecular gas dynamics, and how such properties affect the flow features, the shock waves and the nozzle flows, from a macroscopic viewpoint. In addition, the experimental facilities for the study on the high enthalpy flows are described in a concise and easy-to-understand style. Practical examples are given throughout empha
