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Nota di contenuto	Fundamentals of Turbulent and Multiphase Combustion; Contents; Preface; Chapter 1 Introduction and Conservation Equations; 1.1 Why Is Turbulent and Multiphase Combustion Important?; 1.2 Different Applications for Turbulent and Multiphase Combustion; 1.2.1 Applications in High Rates of Combustion of Materials for Propulsion Systems; 1.2.2 Applications in Power Generation; 1.2.3 Applications in Process Industry; 1.2.4 Applications in Household and Industrial Heating; 1.2.5 Applications in Safety Protections for Unwanted Combustion; 1.2.6 Applications in Ignition of Various Combustible Materials 1.2.7 Applications in Emission Control of Combustion Products1.2.8 Applications in Active Control of Combustion Processes; 1.3 Objectives of Combustion Modeling; 1.4 Combustion-Related Constituent Disciplines; 1.5 General Approach for Solving Combustion Problems; 1.6 Governing Equations for Combustion Models; 1.6.1 Conservation Equations; 1.6.2 Transport Equations; 1.6.3 Common Assumptions Made in Combustion Models; 1.6.4 Equation of State; 1.6.4.1 High-

Pressure Correction; 1.7 Definitions of Concentrations; 1.8 Definitions of Energy and Enthalpy Forms; 1.9 Velocities of Chemical Species
1.9.1 Definitions of Absolute and Relative Mass and Molar Fluxes1.10 Dimensionless Numbers; 1.11 Derivation of Species Mass Conservation Equation and Continuity Equation for Multicomponent Mixtures; 1.12 Momentum Conservation Equation for Mixture; 1.13 Energy Conservation Equation for Multicomponent Mixture; 1.14 Total Unknowns versus Governing Equations; Homework Problems; Chapter 2 Laminar Premixed Flames; 2.1 Basic Structure of One-Dimensional Premixed Laminar Flames; 2.2 Conservation Equations for One-Dimensional Premixed Laminar Flames; 2.2.1 Various Models for Diffusion Velocities
2.2.1.1 Multicomponent Diffusion Velocities (First-Order Approximation)2.2.1.2 Various Models for Describing Source Terms due to Chemical Reactions; 2.2.2 Sensitivity Analysis; 2.3 Analytical Relationships for Premixed Laminar Flames with a Global Reaction; 2.3.1 Three Analysis Procedures for Premixed Laminar Flames; 2.3.2 Generalized Expression for Laminar Flame Speeds; 2.3.2.1 Reduced Reaction Mechanism for HC-Air Flame; 2.3.3 Dependency of Laminar Flame Speed on Temperature and Pressure; 2.3.4 Premixed Laminar Flame Thickness; 2.4 Effect of Flame Stretch on Laminar Flame Speed
2.4.1 Definitions of Stretch Factor and Karlovitz Number2.4.2 Governing Equation for Premixed Laminar Flame Surface Area; 2.4.3 Determination of Unstretched Premixed Laminar Flame Speeds and Markstein Lengths; 2.5 Modeling of Soot Formation in Laminar Premixed Flames; 2.5.1 Reaction Mechanisms for Soot Formation and Oxidation; 2.5.1.1 Empirical Models for Soot Formation; 2.5.1.2 Detailed Models for Soot Formation and Oxidation; 2.5.1.3 Formation of Aromatics; 2.5.1.4 Growth of Aromatics; 2.5.1.5 Migration Reactions; 2.5.1.6 Oxidation of Aromatics
2.5.2 Mathematical Formulation of Soot Formation Model

Sommario/riassunto

Detailed coverage of advanced combustion topics from the author of Principles of Combustion, Second Edition Turbulence, turbulent combustion, and multiphase reacting flows have become major research topics in recent decades due to their application across diverse fields, including energy, environment, propulsion, transportation, industrial safety, and nanotechnology. Most of the knowledge accumulated from this research has never been published in book form-until now. Fundamentals of Turbulent and Multiphase Combustion presents up-to-date, integrated coverage of the fundamentals of tur