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Nota di contenuto	Applications of Turbulent and Multiphase Combustion; Contents; Preface; Chapter 1 Solid Propellants and Their Combustion Characteristics; 1.1 Background of Solid Propellant Combustion; 1.1.1 Definition of Solid Propellants; 1.1.2 Desirable Characteristics of Solid Propellants; 1.1.3 Calculation of Oxygen Balance; 1.1.4 Homogeneous Propellants; 1.1.4.1 Decomposition Characteristics of NC; 1.1.5 Heterogeneous Propellants (or Composite Propellants); 1.1.6 Major Types of Ingredients in Solid Propellants; 1.1.6.1 Description of Oxidizer Ingredients; 1.1.6.2 Description of Fuel Binders 1.1.6.3 Curing and Cross-Linking Agents 1.1.6.4 Aging; 1.1.7 Applications of Solid Propellants; 1.1.7.1 Hazard Classifications of Solid Propellants; 1.1.8 Material Characterization of Propellants; 1.1.8.1 Propellant Density Calculation; 1.1.8.2 Propellant Mass Fraction,; 1.1.8.3 Viscoelastic Behavior of Solid Propellants; 1.1.9 Thermal Profile in a Burning Solid Propellant; 1.1.9.1 Surface and Subsurface Temperature Measurements of Solid Propellants; 1.1.9.2 Interfacial Energy Flux Balance at the Solid Propellant Surface; 1.1.9.3 Energy

Equation for the Gas Phase

1.1.9.4 Burning Rate of Solid Propellants 1.1.9.5 Temperature Sensitivity of Burning Rate; 1.1.9.6 Measurement of Propellant Burning Rate by Using a Strand Burner; 1.1.9.7 Measurement of Propellant Burning Rate by Using a Small-Scale Motor; 1.1.9.8 Burning Rate Temperature Sensitivity of Neat Ingredients; 1.2 Solid-Propellant Rocket and Gun Performance Parameters; 1.2.1 Performance Parameters of a Solid Rocket Motor; 1.2.1.1 Thrust of a Solid Rocket Motor; 1.2.1.2 Specific Impulse of a Solid Rocket Motor; 1.2.1.3 Density-Specific Impulse; 1.2.1.4 Effective Vacuum Exhaust Velocity 1.2.1.5 Characteristic Velocity C*1.2.1.6 Pressure Sensitivity of Burning Rate; 1.2.1.7 Thrust Coefficient Efficiency; 1.2.1.8 Effect of Pressure Exponent on Stable/Unstable Burning in Solid Rocket Motor; 1.2.2 Performance Parameters of Solid-Propellant Gun Systems; 1.2.2.1 Energy Balance Equation; 1.2.2.2 Efficiencies of Gun Propulsion Systems; 1.2.2.3 Heat of Explosion (Hoex); 1.2.2.4 Relative Quickness, Relative Force, and Deviations in Muzzle Velocity; 1.2.2.5 Dynamic Vivacity; Chapter 2 Thermal Decomposition and Combustion of Nitramines

2.1 Thermophysical Properties of Selected Nitramines 2.2 Polymorphic Forms of Nitramines; 2.2.1 Polymorphic Forms of HMX; 2.2.2 Polymorphic Forms of RDX; 2.3 Thermal Decomposition of RDX; 2.3.1 Explanation of Opposite Trends on - and -RDX Decomposition with Increasing Pressure; 2.3.2 Thermal Decomposition Mechanisms of RDX; 2.3.2.1 Homolytic N-N Bond Cleavage; 2.3.2.2 Concerted Ring Opening Mechanism of RDX; 2.3.2.3 Successive HONO Elimination Mechanism of RDX; 2.3.2.4 Analysis of Three Decomposition Mechanisms; 2.3.3 Formation of Foam Layer Near RDX Burning Surface

2.4 Gas-Phase Reactions of RDX

Sommario/riassunto

A hands-on, integrated approach to solving combustion problems in diverse areas An understanding of turbulence, combustion, and multiphase reacting flows is essential for engineers and scientists in many industries, including power generation, jet and rocket propulsion, pollution control, fire prevention and safety, and material processing. This book offers a highly practical discussion of burning behavior and chemical processes occurring in diverse materials, arming readers with the tools they need to solve the most complex combustion problems facing the scientific community today.