MODELING OF MIXING AND COMBUSTION PROCESSES FOR HIGH-ENTHALPY AIR FLOW AND VARIOUS FUELS

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Modeling of mixing and combustion processes for high-enthalpy air flow and various fuels is a vital task for development of advanced engines for high-velocity aircrafts. When using solid propellants, fuel feed system become more complicated owing to great amount of condensed particles in gas flow mixing with air. Numerical analysis was applied to estimate the mixing and combustion efficiency for design enhancement. The results of numerical simulation of two-phase flow and air mixing are presented. When using hydrogen as fuel for air-propulsion systems there are various methods to model mixing and combustion. In this work hydrogen mixing, ignition and combustion in high-enthalpy air flow was calculated with kinetic multistage scheme (Dimitrov) for different injection types. Temperature, pressure, velocity and concentration fields, obtained from the computational analysis, allow choosing appropriate fuel feed system.