TRIGGERING OF DETONATION PROCESSES IN PROPULSION CHAMBER

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Abstract: The Navier–Stokes equations have been used for numerical modeling of chemically reacting gas flow in the propulsion chamber. The chamber represents an axially symmetrical plane disk. Fuel and oxidant were fed into the chamber separately at some angle to the inflow surface and not parallel one to another to ensure better mixing of species. The model is based on conservation laws of mass, momentum, and energy for nonsteady two-dimensional compressible gas flow in the case of axial symmetry. The processes of viscosity, thermal conductivity, turbulence, and diffusion of species have been taken into account. The possibility of detonation mode of combustion of the mixture in the chamber was numerically demonstrated. The detonation triggering depends on the values of angles between fuel and oxidizer jets. This type of the propulsion chamber is effective because of the absence of stagnation zones and good mixing of species before burning.

Keywords: modeling; turbulence; compressible flows; heat release; detonation; mixing

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