Numerical simulation of the combustion processes in the model high-velocity combustion chamber

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The paper is dedicated to the problem of a combustion chamber formation. Initial geometry of the combustion chamber was obtained from one-dimension method that based on the optimization procedure to providing the best model drag characteristics. Following calculations were preceded in the two-dimension statement. The combustion chamber integrates with an air intake and a nozzle. Two most widely spread combustion regimes were observed in the paper (high-velocity combustion and combustion in a wave structure of a pseudoshock type). Gas-dynamic flow features in each regime were researched. Main integral characteristics of combustion chamber duct were obtained. Influence of the different hydrogen-pylons arrangement on the combustion process efficiency was explored. Moreover the influence of the isolator shape on the flow pattern was demonstrated. For numerical calculation used set of computer programs FNAS 3D, developed in CIAM. This program is based on the procedure for finding time steady-state solution using Godunov S.K. numerical scheme. A full set of Favre-averaged Navier–Stokes equations for unsteady turbulent reacting flows uses in the program. To describe the combustion of hydrogen–air mixture using a Dimitrov’s detailed kinetic mechanism. .