COMPUTATIONS OF FLOW IN A MODEL HIGH-SPEED COMBUSTOR USING DIFFERENT KINETIC SCHEMES

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Abstract: The paper describes the results of numerical simulation of hydrocarbon fuel combustion stabilization in a flat duct with cold supersonic air flow at the entrance. Ignition is performed through the inflow of compressed air jet from the duct wall. When the basic variant of kinetic scheme is used, the throttling does not lead to self-ignition. To get the combustion, a modification of kinetic scheme is introduced that takes into account the low-temperature multistage self-ignition of hydrocarbons. As a result, flow regime with undamped longitudinal flame oscillations is obtained. Such regime has already been observed in calculations of flow with higher temperature with the use of basic kinetic scheme. It is found that the same mechanism of oscillations works in both cases, though the new calculations contain effects of multistage self-ignition. The independency of stabilized oscillations upon transitional process of flame development is shown.

Keywords: high-speed combustor; hydrocarbon fuel; low-temperature multistage self-ignition; flame oscillations

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