

## FLOW DEVELOPMENT IN A HIGH-SPEED COMBUSTOR AT VARIOUS VALUES OF AIR EXCESS RATIO

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**Abstract:** On the basis of numerical simulation, the process of hydrocarbon fuel combustion stabilization in a flat duct with cold supersonic air flow at the entrance is described. Three values of air excess ratio  $\alpha$  are considered. Oscillations of pseudoshock and combustion zone, obtained in calculations for  $\alpha = 1.34$  and  $1.99$ , are analyzed. Dependence of solution upon the spacing of computational grid is studied. It is shown that structure and frequency of the oscillatory process do not depend upon the grid. Variation of the frequency of oscillations in the duct during calculation is explained. For unstable flow regime ( $\alpha = 2.45$ ), solutions with stationary combustion and with flame blow-off are obtained and analyzed. The results of calculations are compared with experimental data, obtained in T-131 wind tunnel (TsAGI).

**Keywords:** high-speed combustor; hydrocarbon fuel; air excess ratio; flame oscillations; flameout

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*Received December 18, 2015*

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