PULSE DETONATION THRUST MODULE

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Abstract: The thrust module (TM) for an aircraft designed for a subsonic flight at a speed of up to 120 m/s when operating on a standard aviation kerosene TS-1 was developed using the analytical estimates and parametric multivariant three-dimensional calculations. The TM consists of an air intake with a check valve, a fuel supply system, a prechamber-jet ignition system, and a combustion chamber with an attached detonation tube. An experimental sample of TM was fabricated and its firing tests were carried out on a test rig with a thrust-measuring table. In firing tests, TM characteristics are obtained in the form of dependencies of effective thrust, aerodynamic drag, and fuel-based specific impulse on fuel consumption at different speeds of the approaching air flow. It has been experimentally shown that the fuel-based specific impulse of the TM reaches 1000–1200 s, and the effective thrust developed by it reaches 50 N. The reasons for the significant difference between the measured and analytically estimated values of the effective thrust are discussed.

Keywords: pulsed detonation engine; thrust module; aviation kerosene; three-dimensional simulation; experimental sample; thrust performance; fuel-based specific impulse

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