STUDY OF PRESSURE FLUCTUATIONS IN A SOLID ROCKET MOTOR CHAMBER IN QUASI-STATIONARY OPERATION MODE

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Abstract: The dynamic model of intrachamber processes in a solid rocket motor (SRM) taking into account the inertia of gas-phase processes of solid-rocket propellant combustion wave is proposed. The model is based on the induction mechanism of propellant combustion. The induction mechanism is modeled using specific parameters of inertia — a conversion time of thermodynamically nonequilibrium products of propellant thermal decomposition from k-phase to the thermodynamically equilibrium gas-phase products of combustion (delay time τ) and the instability factor r, the value of which defines the effect of pressure on the delay time. The intrachamber factor of instability was identified, namely, the transient and periodic nature of combustion rate of propellant with inertial gas phase. A causal relationship of differences in the engine combustion rate from the combustion rate in a constant-pressure bomb with pressure fluctuations was found.

Keywords: pressure fluctuations; relaxation time; gas phase; propellant k-phase; intrachamber process

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