USE OF EXPERIMENTALLY OBTAINED CHARACTERISTICS OF SOLID FUEL COMBUSTION FOR CALCULATING GAS-THERMODYNAMIC PROCESSES IN A COMBUSTION CHAMBER

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Abstract: A generalized model of solid fuel combustion process in a high-speed air flow is proposed and a technique for determining the parameters of this model is developed on the basis of experimental data obtained in advance for a given fuel. The technique is based on solving a series of inverse problems simulating experimental regimes with solid fuel combustion. The authors consider the subsonic air flow in a cylindrical duct with a central body on which the annular piece of solid fuel is located. The solution of the inverse problem is accomplished by minimizing the residual functional between the experimental and calculated data. Based on the results of calculations, the parameters of the generalized combustion model are found, which provide sufficient accuracy for all flow regimes considered in the experiment. The use of the generalized combustion model parameters enables one to numerically simulate the combustion of a given fuel in combustion chambers of various geometry.

Keywords: solid fuel; flow in duct; combustion; inverse problems

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