MATHEMATICAL MODEL OF THE WORKING PROCESS IN THE GTE COMBUSTOR FUELING ON METHANOL

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One of the main types of fuel consumed by mankind is natural gas. The continuous rise in energy consumption requires the development of its new deposits, usually remote from the consumer. It is not always possible to transport gaseous fuel through a pipeline, so the gas is liquefied and delivered to the consumer at cryogenic temperatures (about -160℃) in tanks [1]. Both these ways, the construction of a gas pipeline and the transportation of liquefied methane, are quite costly.

An alternative method of transporting methane is possible. Methanol from methane can be obtained chemically in the immediate vicinity of the production site, which greatly simplifies its transportation.

At the same time, the possibility of using alternative fuels is actively considered in the field of engine design. One such type of fuel is methanol. Its advantages as a fuel for GTE are low cost, environmental friendliness, various methods of production (including renewable energy sources), ease of engines conversion from petroleum products to methanol.

The benefits of using methanol in engine technology and natural gas industries make it a promising alternative type of fuel. The scientific literature contains a sufficient number of studies on the analysis of the methanol used as a fuel for industrial and aviation GTE, as well as ramjets [2, 3]. However, these sources do not present a mathematical model of the combustion chamber working process, which makes it possible to determine the relative fuel consumption.

In the reference [4], the authors presented a mathematical model of the working process in the GTE combustion chamber operating on kerosene, and also carried out its verification using experimental data for the combustor of the General Electric CF6-80A (the average calculation error was about 4%) [2]. Based on the obtained model of the combustor, the authors developed a mathematical model of the working process in the combustor operating on methanol, and carried out its verification. The comparison of the calculated results with experimental data showed the average calculation error approximately 3.5%.

The developed calculation technique is characterized by relative simplicity and easy implementation into existing mathematical models of engines.

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