

3D modelling of heat and mass transfer processes during the combustion of liquid fuel

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In this article numerical study of the processes of atomization and combustion of two kinds of liquid fuel by using the statistical model of breakup and dispersion of the drops was conducted. The octane and dodecane were used as liquid fuels in the researches. There was also constructed the model of the combustion chamber in a cylinder form. During the numerical simulation has been determined optimum combustion mode for two types of liquid fuel. The initial temperature in the combustion chamber was varied from 700 to 1500 K. It was shown that for the two types of liquid fuel the oxidant's optimal initial temperature in the combustion chamber is 900 K. It was determined the optimum value of the initial temperature in the combustion chamber. Computational experiments on research of the distribution of the maximum temperature, the concentration of the combustion products and the dispersion of liquid particles were performed.

Keywords: liquid fuel, numerical modeling, octane, dodecane, combustion, statistical model, initial temperature