
USAGE OF OXYGEN-AND-METHANE PROPELLANT IN LIQUID-PROPELLANT ROCKET ENGINES

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The article examines the possibility of using liquid oxygen-and-liquid methane propellant in liquid-propellant rocket propulsions. First, we make a comparison of methane and kerosene as rocket fuel, then we describe physical, chemical and operational properties of methane suggesting its prospects as a fuel for rocket engines. Moreover, we give a review of currently developed methane propellant rocket engines. The paper considers the task of a comprehensive cooling for full implementation of oxygen-and-methane fuel as one of the main concerns. To solve the problem of internal cooling, we obtained the function from engine nozzle consumption to fuel-to-oxidizer ratio. To solve the problem of external cooling, we studied the relation between function of thermophysical parameters determining the value of the convective heat flux from gas to engine wall, fuel-to-oxidizer ratio and hot wall temperature. Finally, we analyze in detail the obtained results, which enable to determine methane and oxygen ratio in the boundary layer in terms of a propellant rocket engine cooling.

Keywords

Liquid-propellant rocket engines, liquid methane, prospective rocket fuel, cooling of rocket engine, fuel-to-oxidizer ratio

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