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THE CONFIGURATION DESIGN AND OPTIMIZE OF AN EFFICIENT PLATELET HEAT EXCHANGER USED IN SOLAR THERMAL PROPULSION

Abstract

Solar thermal propulsion will be widely used in space propulsion owing to its high specific impulse. And it is a significant issue to improve the heat transfer efficiency of the solar thermal thruster. This paper proposes a platelet configuration to be used in the heat exchanger core, which is the most important component of solar thermal system. The platelet passage can enhance the heat transfer between the propellant and the hot core heated by the concentrated sunlight. Based on fluid-solid coupled heat transfer, the paper utilized the platelet heat transfer characteristic to simulate the heat transfer and flow field of the platelet passage. The configuration parameters of the platelet are optimized to find the best passage design. The length and sectional area of the platelet metering passage are the main factor of the platelet heat exchanger efficiency. And the simulation result shows that the propellant can be heated to the design temperature of 2400K for the thermal propulsion system.