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STUDY ON THE PROPELLANT ABLATION PROPERTIES OF LASER ABLATION PROPULSION

Abstract

Laser ablation propulsion is one of the most potential advanced propulsion concepts, which has the notable advantage of high rate in propellant use and strong controllability. In order to improve the propulsion performance of laser ablation propulsion, PTFE energetic material, a kind of composite propellant, is used to explore the ablation properties. A three dimensional model of the ablation propellant before and after meltdown under continuous laser is established through numerical analysis. On the other hand, the infrared thermometer is used to measure the temperature field of propellant. The result exhibits that the temperature in the laser focus area is as same as the laser model which correspond to Gaussian law. Moreover, the chemical property of propellant becomes more active with the increase of Al proportion in PTFE propellant. The ignition temperature points of different proportion propellant are obtained with enough experimental data. The main aim of this paper is to obtain accurate ratio of Al in PTFE propellant and suitable power of laser so that propulsion systems can reach the goal of higher and higher efficiency.