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AEROTHERMAL CHARACTERISTICS OF A GLIDING REENTRY VEHICLE WITH LOW BALLISTIC COEFFICIENT AND HIGH LIFT-TO-DRAG

Abstract

How to mitigate the aerodynamics heating of reentry vehicle is one of the most important factors for the reentry vehicle design. In this paper, a reentry vehicle with low ballistic coefficient and high lift-to-drag ratio are presented to mitigate the aerodynamics heating by gliding down slowly at high altitude. Firstly its aerodynamic performance at different altitudes and attacking angles is simulated. Then the slip-glide reentry trajectory is calculated according to the aerodynamic performances. Finally, with the assumption of instantaneous radiation equilibrium, the heat flux and temperature distribution vary with time are studied by the engineering method. The simulated results show that the low ballistic coefficient and high lift-to-drag ratio permit the vehicle to glide down slowly at high altitude that mitigates the aerodynamics heating along the trajectory. So the maximum temperature along the trajectory is decreased on the vehicle surface, which is not higher than 1600K at the stagnation point.