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PARAMETRIC STUDY ON AERODYNAMIC CHARACTERISTICS OF RE-ENTRY CAPSULES

Abstract

The aerodynamic configuration design and aerodynamic characteristics investigation of re-entry capsules play an important role on the design of manned spacecrafts for space exploration. Comparative analysis of the aerodynamics between Soyuz and Apollo/CEV configurations is accomplished in the paper. And the influence of geometric parameters on the aerodynamics of Soyuz configuration is analyzed, including the characteristics of lift, drag, stability, and trim. The results show that the lift-to-drag ratio of Soyuz configuration can be substantially increased by increasing the afterbody angle or the heat shield radius. That is to say, adjusting and optimizing the geometric parameters of Soyuz re-entry capsules is a feasible way for designing a capsule configuration to meet the high lift-to-drag ratio requirement of manned re-entry at second cosmic velocity.