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Author: Mr. zhang hui
China Academy of Launch Vehicle Technology (CALT), China, 13811631203@163.com

DESIGN AND PERFORMANCE EVALUATION OF REUSABLE LAUNCH VEHICLE AERODYNAMIC LAYOUT

Abstract

Reusable launch vehicle is a kind of reentry, horizontal landing vehicle. According to the reentry mission requirements of the reentry vehicle, this paper designs a new type of aerodynamic layout. In the design process, the parametric method was used for the shape modeling.And then,we use a program to generate the Cartesian grid automatically and solve the Euler equations to get the aerodynamics for the layout selection. The design and calculation of sample experiment were used to design the optimization conditions.Then the multi objective genetic optimization based on agency model technology was used for choosing a best performance layout.In the light of this aircraft layout, the three-dimensional compressible N-S equations were solved to simulate the aerodynamic characteristics using structured grid, the aerodynamic characteristics of vehicle analysis shows that, the aerodynamic layout has good stability. Reentry trajectory design and thermal environment analysis show that, the layout can meet the lift to drag ratio and thermal environment of re-entry constraint. The research results can be used for reference in design of the reusable launch vehicles.