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INVESTIGATION OF THE GRID-DEPENDENCY IN HEAT TRANSFER SIMULATION FOR
HYPERSONIC VEHICLE

Abstract

For the numerical simulation of the hypersonic vehicle aerothermal heating, the grid-dependency of the aerothermal computation under the hypersonic flow was studied by the means of computational fluid dynamic. By employed two-dimensional cylinder model, researched the influence of the grid-reynolds number to heat transfer simulation, and established the connection between grid refinement in position of shock wave and the heat transfer computational accuracy. The result indicates that the grid-reynolds number less than 8 can gain a convergent result of heat transfer and the grid refinement in the shock position is beneficial for heat transfer simulation. Besides, the applicability of the grid criterion to the computation of three-dimensional model was verified by the aerothermal simulation of the X-33 hypersonic vehicle. The research has some guiding significance for engineering applications.