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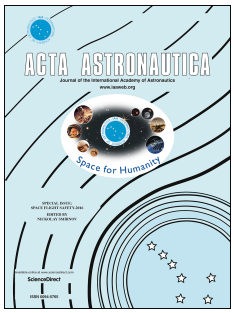

Aerodynamic performance investigation on waverider with variable blunt radius in hypersonic flows

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Aerodynamic performance investigation on waverider with variable blunt radius inhypersonic flows

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Abstract: Waverider is an important candidate for the design of hypersonic vehicles. However, the ideal waverider cannot be manufactured because of its sharp leading edge, so the leading edge should be blunted. In the paper, the HMB solver and laminar flow model have been utilized to obtain the flow field properties around the blunt waverider with the freestream Mach number being 8.0, and several novel strategies have been suggested to improve the aerodynamic performance of blunt waverider. The numerical method has been validated against experimental data, and the Stanton number(*St*) of the predicted result has been analyzed. The obtained results show good agreement with the experimental data. St_{max} decreases by 58% and *L/D* decreases by 8.2% when the blunt radius increases from 0.0002m to 0.001m. “Variableblunt waverider” is a good compromise for aerodynamic performance and thermal insulation. The aero-heating characteristics are very sensitive to R_{max}. The position of the smallest blunt radius has a great effect on the aerodynamic performance. In addition, the type of blunt leading edge has a great effect on the aero-heating characteristics when R_{max} is fixed. Therefore, out of several designs, Type 4is the best way to achieve the good overall performance. The “Variable blunt waverider”

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