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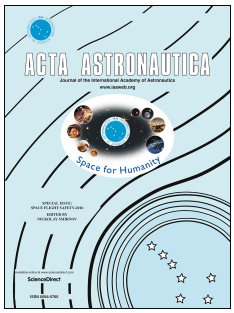


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# Numerical experiment on the flow field properties of a blunted body with a counterflowing jet in supersonic flows

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**Abstract**: The prediction of the drag and heat flux reduction characteristics is a very important issue in the conceptual design phase of the hypersonic vehicle. In this paper, the flow field properties around a blunted body with a counterflowing jet in the supersonic flow with the freestream Mach number being 3.98 were investigated numerically, and they are obtained by means of the two-dimensional axisymmetric Reynolds-averaged Navier-Stokes (RANS) equations coupled with the two equation standard k-ε turbulence model. The surface Stanton number distributions, as well as the surface static pressures, were extracted from the flow field structures in order to evaluate the drag and heat flux reduction characteristics. Further, the influences of the jet pressure ratio and the jet Mach number on the drag and heat flux reduction were analyzed based on the detailed code validation and grid independency analysis process. The obtained results show that the flow cell Reynolds number has a great impact on the heat flux prediction, and its best value is 5.0 for the case studied in the current study. However, the flow cell Reynolds number and the grid scale both have only a slight impact on the prediction of the surface static pressure distribution, as well as the turbulence model. The larger jet pressure ratio is beneficial for the drag and heat flux reduction, and the smaller jet Mach number is beneficial for the heat

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