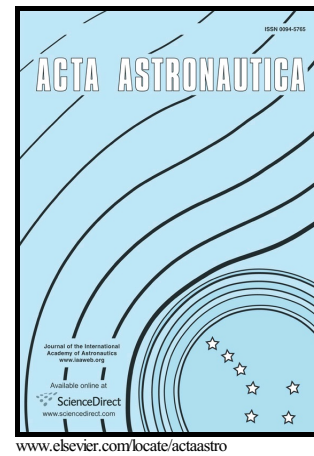


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Drag and heat reduction mechanism induced by a combinational novel cavity and counterflowing jet concept in hypersonic flows

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1 **Drag and heat reduction mechanism induced by a combinational novel cavity**
2 **and counterflowing jet concept in hypersonic flows**

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6
7 **Abstract:** The drag and heat reduction problem of hypersonic reentry vehicles has always
8 attracted the attention worldwide, and many novel schemes have been proposed recently. In the
9 current study, the research progress of the combinational configuration of the forward-facing
10 cavity and the counterflowing jet has been reviewed, and the conventional cavity configuration
11 has been substituted by an approximate maximum thrust nozzle contour for better heat and surface
12 pressure reduction efficiency. The Reynolds-average of Navier-Stokes (RANS) equations coupled
13 with the SST $k-\omega$ turbulence model have been employed to calculate its surrounding flow fields. A
14 validation metric and the grid convergence index (GCI) have been employed to conduct the
15 turbulence model assessment and the grid independence analysis respectively. The axisymmetric

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