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SPACE PROPULSION SYMPOSIUM (C4)
Hypersonic and Combined Cycle Propulsion (9)

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RESEARCH ON AERODYNAMIC PERFORMANCE OF A TYPICAL HYPERSONIC INWARDTURNING INLET

Abstract

A typical hypersonic inward-turning inlet is designed and its aerodynamic performances are calculated and analysed in this paper. Firstly, osculating internal-compressional curved cone under the consideration of blunt tip is used to generate basic flow field with an integrated external-internal compression. In order to fit vehicles and scramjet, a method of transition from an appointed captured shape to a round cross section is adopted to fusing every flow streams. Then, the numerical simulation with CFD is carried out especially at Mach Number 5. The typical aerodynamic characteristics of the inward-turning inlet are obtained by giving the general data and typical flow field of the inlet. Also, the numerical results of the inlet starting characteristics are checked at Mach Number 6 with the experimental data under shock-wind tunnel. Finally, the conclusions are drawn from the paper including the structure of the internal flow field and the self-started characteristics of inward-turning inlet and how to control the flow field to improve the performance of the inlet must be concerned in the field of inward-turning inlet. Keywords: hypersonic inlet, inward-turning inlet, aerodynamic performance (aero-performance), structure of flow field.