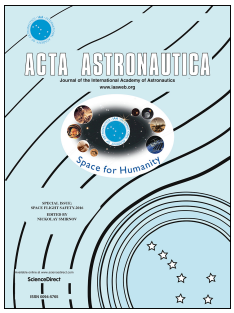
Accepted Manuscript



Hypersonic shock wave transitional boundary layer interactions - A review

Doyle Knight, Mahsa Mortazavi

PII: S0094-5765(18)30101-2

DOI: 10.1016/j.actaastro.2018.06.019

Reference: AA 6937

To appear in: *Acta Astronautica*

Received Date: 14 January 2018

Revised Date: 1 June 2018

Accepted Date: 5 June 2018

Please cite this article as: D. Knight, M. Mortazavi, Hypersonic shock wave transitional boundary layer interactions - A review, *Acta Astronautica* (2018), doi: 10.1016/j.actaastro.2018.06.019.

Hypersonic Shock Wave Transitional Boundary Layer Interactions - A Review

Doyle Knight[1], Mahsa Mortazavi[2]

Rutgers - The State University of New Jersey, New Brunswick, New Jersey 08903, USA

Abstract

Hypersonic shock wave *transitional* boundary layer interactions can result in significantly greater peak surface heat transfer than laminar or turbulent interactions. Consequently, the understanding of the flowfield structure of hypersonic shock wave transitional boundary layer interactions is important. Moreover, the capability to predict the mean and fluctuating aerothermodynamic loading due to such interactions is needed for effective design of hypersonic vehicles. A review of hypersonic shock wave transitional boundary layer interaction research since 1993 is presented. Significant progress has been achieved in the understanding of the flowfield structure. The most promising prediction methodology is Direct Numerical Simulation (DNS); however, DNS requires dynamic (*i.e.*, time varying) inflow boundary conditions for five flow variables (*i.e.*, three components of velocity, and two thermodynamic variables), and such experimental data is presently infeasible. Additional research is needed to understand the effect of assumed dynamic inflow boundary conditions on DNS prediction of aerothermodynamic loads.

Keywords: Hypersonic Flow, Shock Wave Boundary Layer Interaction, Transitional Flow

[1]Professor, Department of Mechanical and Aerospace Engineering.
Email: doyleknight@gmail.com.
[2]PhD, Department of Mechanical and Aerospace Engineering.
Email: mahsa.mortazavi89@gmail.com.