HEAT FLUX PREDICTION IN A KEROSENE FUELLED SCRAMJET COMBUSTOR THROUGH CFD

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Abstract

Thermo-structural design of high speed propulsive systems require heat transfer as an input. Nonreacting and reacting flow simulations are carried out to predict the heat transfer characteristics of scramjet combustor using commercial software. The software employs finite volume method to solve 3-D RANS equations along with SST-k□□turbulence model and infinitely fast chemistry. The flow through a convergent-divergent nozzle is taken as validation test case and very good match is obtained between computed heat flux and experimental data. It is observed that minimum 10 micron 1st grid spacing is required to predict wall heat flux accurately and grid independence of heat flux data is demonstrated. Heat transfer coefficient is independent of various isothermal walls and computed heat fluxes are higher at combustion intense zone behind fuel injection struts.

Keywords: Reacting Flow, Scramjet Combustor, Grid Independence, Heat Flux