TRANSPORT EQUATION TRANSITION MODELING IN CERANS FOR HYPERSONIC FLOWS

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Abstract

Scope of present work covers implementation to validation of the Langtry-Menter two equation γ-$Re_{\theta t}$ Local Correlation based Transition Model (LCTM) in CERANS code for modelling subsonic to hypersonic flow transition. The LCTM is coupled with SST k-ω turbulence model. The governing equations of γ-$Re_{\theta t}$ model is discretized in finite volume framework similar to the RANS model and implicitized using the point Jacobi method. Transition correlations based on freestream as well as local turbulence intensity and critical momentum thickness Reynolds number were integrated with the model, and the code is validated for several standard transition test cases involving low subsonic to hypersonic high enthalpy flows covering a wide range of turbulent intensities.

Keywords: CERANS, γ-$Re_{\theta t}$ Transition Model, Correlation, Hypersonic Flow, Implementation, Validation