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Effect of Temperature on Turbulent Shear-Layer and Shockwave Interaction ROZIE ZANGENEH, Lawrence Technological University — The boundary-layer separation and subsequent reattachment due to the free shear-layer and shockwave interaction have a large impact on the aerothermal design of supersonic aerospace systems. This problem is prevalent in high-speed flights and can significantly affect the skin friction, aerodynamics loads, and heat transfer. In recent years considerable progress has been achieved in the prediction of reattaching free shear-layer for compressible turbulent flows using DNS and LES. However, not considerable DNS or LES results for surface heat transfer in shockwave-turbulent boundary layer interaction are available. This is particularly important since prior RANS simulations of strongly separated shockwave-turbulent boundary layer interactions have failed to predict heat transfer accurately. In this study, the effect of heat transfer on the turbulent shear-layer and shockwave interactions in a scramjet has been investigated. To this end, Large Eddy Simulations are performed to explore the effect of wall thermal conditions on the behavior of a reattaching free shear layer interacting with and oblique shock in compressible turbulent flows. Different cases of wall to recovery temperature ratios are performed, and results are compared to the adiabatic wall.

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