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Flow Dynamics Near the Turbulent/Non-Turbulent Interface in Compressible Shear Layers NAVID S. VAGHEFI, REZA JAHANBAKHSHI, CYRUS K. MADNIA, State University of New York at Buffalo — Direct numerical simulation (DNS) of compressible turbulent shear layers at varying convective Mach numbers are used to assess the flow dynamics in proximity of the turbulent/non-turbulent interface (TNTI) separating the turbulent and the irrotational regions. This interface is identified by using a certain threshold for the vorticity norm. For both incompressible and compressible mixing layers, the TNTI layer thickness is found to be approximately one Taylor length scale. The conditional flow statistics based on the normal distance from the TNTI are compared for different convective Mach numbers. The terms in total kinetic energy, turbulent kinetic energy, and vorticity transport equations are examined in order to determine the effects of compressibility on the transport mechanisms across the TNTI. For all the convective Mach numbers, different terms in these equations are scaled with the Taylor length and velocity scales in interface coordinates. It is observed that for compressible cases, the intense vortical structures (IVS) generate a baroclinic torque as they become close to the TNTI.

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