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Some Characteristics of Entrainment in a Compressible Turbulent Mixing Layer REZA JAHANBAKHSHI, NAVID S. VAGHEFI, CYRUS K. MADNIA, State University of New York at Buffalo — The results of direct numerical simulation (DNS) of temporally evolving compressible mixing layer are used to study the entrainment process across the turbulent/non-turbulent interface (TNTI) separating the turbulent and the irrotational regions. This interface is detected by using a certain threshold for the vorticity norm. The compressible form of the conservation equations for mass, momentum, energy, and conserved scalar are solved. The local entrainment velocity is calculated using the enstrophy transport equation. Conditional averages of the terms in this equation across TNTI are examined in order to gain a better understanding of the physical mechanisms contributing to entrainment. The entrainment process in turbulent flows can be associated with two different mechanisms. Nibbling, which is related with small scale motions, and engulfment, which is mostly due to large scale motions. The role of each mechanism is examined. The local entrainment velocity is also decomposed into an inviscid and a viscous part, and the contribution of each part is evaluated. The role of compressibility on the entrainment process is also studied.

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