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Turbulent entrainment in jets: the role of the large and small scales of motion CARLOS B. DA SILVA, JOSE FERNANDES PEREIRA, IDMEC/IST Technical University of Lisbon, Portugal — This work analysis several large and small scale aspects of the turbulent entrainment mechanism that exists in mixing layers, wakes, and jets. The turbulent entrainment mechanism takes place across the turbulent/nonturbulent (T/NT) interface dividing the irrotational (nonturbulent - NT) from the turbulent (T) region in these flows. Recently da Silva and Pereira (Phys. Fluids, 20, 055101, 2008) using DNS of a turbulent plane jet analyzed the invariants of the velocity-gradient, rate-of-strain, and rate-of-rotation tensors across the T/NT interface in order to characterize the small scale dynamics near the T/NT interface. In the present work we focus on the intense vorticity structures (IVS) from the flow in order to analyze the interplay between the large and small scales of the flow during the turbulent entrainment. An interesting result is the existence of non negligible viscous dissipation rate outside the turbulent region. It turns out that this interesting phenomena is caused the the presence of IVS near the T/NT interface. The presentation will focus on how the presence of these IVS commands the evolution of many small scale quantities and ultimately imposes the entrainment rate.

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