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Effects of mean shear on the local turbulent entrainment process MARC WOLF, MARKUS HOLZNER, BEAT LUTHI, DOMINIK KRUG, WOLF-GANG KINZELBACH, Institute of Environmental Engineering, ETH Zurich, 8093 Zurich, Switzerland, ARKADY TSINOBER, School of Mechanical Engineering, Faculty of Engineering, Tel Aviv University, Tel Aviv 69978, Israel — We report on effects of mean shear on the turbulent entrainment process focusing in particular on their relation to small scale processes in the proximity of the turbulent/non-turbulent interface (TNTI). Three-dimensional particle tracking velocimetry measurements of an axisymmetric jet are compared to data from a direct numerical simulation of a zero-mean-shear flow. Conditional statistics relative to the interface position are investigated in a pseudo-Eulerian (i.e. in a fixed frame relative to the interface position) and in a Lagrangian view. A mapping between distance to the instantaneous interface versus conditional time along the trajectory shows that entraining particles remain initially close to the TNTI. Furthermore, decomposing the local entrainment velocity v_n into mean and fluctuating components, we find that mean shear enhances the local entrainment velocity via inviscid and viscous effects.

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