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Entrainment rates and quadrant events across the turbulent/non-turbulent interface over a turbulent boundary layer ANGELIKI LASKARI, ROELAND DE KAT, R. JASON HEARST, BHARATHRAM GANAPATHISUBRAMANI, University of Southampton — Mass entrainment rates across the turbulent non/turbulent interface (TNTI) of a turbulent boundary layer ($Re_\tau = 5300$) are estimated using time-resolved planar particle image velocimetry (PIV). The resulting entrainment velocities are found to be of the order of the friction velocity and are distributed around a positive net entrainment rate. The latter is in agreement with theoretical estimations of average mass entrainment rates, based on boundary layer growth. Effects of the interface geometry and wall-normal location on entrainment are also investigated and the average TNTI location is shown to have a moderate effect on the resulting mass flux rate. More specifically, larger positive entrainment values are found to be correlated with higher than average interface locations, a case that is also linked with a strong prominence of $Q2$ events at the vicinity of the TNTI. For lower TNTI locations, where larger detrainment values are observed, $Q4$ events are shown to dominate below the interface. This scenario is also linked with less convoluted interface shapes, although the total path length of the interface itself does not appear to directly influence the entrainment rate.

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