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Lagrangian evolution of fluid particles in the vicinity of the turbulent non-turbulent interface of a turbulent boundary layer[1] CALLUM ATKINSON, PAUL STEGEMAN, LTRAC, Monash Univeristy, Australia, JASON HACKL, GUILLEM BORRELL, School of Aeronautics, Universidad Politecnica de Madrid, Spain, JULIO SORIA, LTRAC, Monash Univeristy, Australia — Lagrangian evolution of a fluid in the immediate vicinity of the turbulent non-turbulent interface (TNT) of a turbulent boundary layer ($\mathrm{Re}_\tau \approx 800$) is investigated via direct numerical simulation (DNS) and particle tracking. The TNT interface in the DNS is seeded with particles whose evolution in position, velocity and velocity gradient tensor (VGT) are calculated. The velocity and velocity gradients at each particle are determined using a third order Hermite spline interpolation. Probability density functions (PDFs) associated with the change in position, velocity, enstrophy and dissipation are calculated and the evolution of the local flow topology of the fluid near the TNT is examined in terms of the 2nd and 3rd invariants of the VGT (Q and R). Evolution in the QR-plane is compared with conditional mean evolution trajectories and the entrainment and expulsion of particles across the interface are discussed.

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