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Vorticity Based Intermittency in the Single Stream Shear Layer (SSSL) JOHN FOSS, KYLE BADE, Michigan State University, RICHARD PREVOST, DOUGLAS NEAL, LaVision Inc. — The uniquely large scale and high Reynolds number, Re(θ)=65120, single stream shear layer (SSSL), extensively studied by Morris and Foss (2003), has been investigated using overlapped PIV images. The PIV data focus on the low-speed side: 0<u/U<0.8, of the SSSL. The PIV data complement the hot-wire data which were previously used to extensively examine the high-speed side of the SSSL. (The PIV results overcome significant uncertainty sources of hot-wire anemometry as the time-mean streamwise velocity approaches zero on the low-speed side of the SSSL.) Conventional stochastic values have been obtained using the PIV results. The substantial value of this study is to exploit the unique irrotational state of the entrainment stream, which allows the in-principle designation for intermittency as: I=1 if the point-wise vorticity is non-zero, and I=0 where vorticity equals zero with high spatial resolution. These measures can be used to identify the viscous super-layer (VSL) as the border between the two domains.

Morris, S.C. and Foss, J.F. (November 2003) "Turbulent boundary layer to single-stream shear layer: the transition region," Jour. Fluid Mechanics, 494, pp. 187-221.

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