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Evolution of the turbulent/non-turbulent interface in the near field of an axisymmetric jet JAMES DAWSON, DHIREN MISTRY, Norwegian University of Science and Technology (NTNU) — We characterise the near-field evolution of an axisymmetric jet by considering the multi-scale topology of the turbulent/non-turbulent interface (TNTI). Using planar laser-induced fluorescence data from a high Reynolds number jet we implement a multi-scale methodology to evaluate the fractal dimension of the TNTI as a function of streamwise distance. We show that the streamwise evolution of the fractal dimension, D_f, of the TNTI reaches a plateau just beyond the potential core which was measured to be $x/d \approx 4.5$ in the current experiment. Downstream of the potential core we show that $D_f \approx 0.33$, which agrees with recently reported values of D_f measured in fully-developed turbulent flows, such as the far-field of a jet and in turbulent boundary layers. The onset of this fractal behaviour also coincides with evidence of flow homogeneity based on the radial auto-correlation functions of axial and radial velocity fluctuations. These results indicate that the flow-field about the TNTI beyond the potential core exhibits a hierarchy of scales (turbulent cascade) that is characteristic of fully-developed turbulence.

James Dawson
Norwegian University of Science and Technology (NTNU)

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