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Fine-scale features in the far-field of a turbulent jet OLIVER BUXTON, BHARATHRAM GANAPATHISUBRAMANI, Imperial College London — The structure of a fully turbulent axisymmetric jet, at Reynolds number based on jet exit conditions of 5000, is investigated with cinematographic (1 kHz) stereoscopic PIV in a plane normal to the jet axis. Taylor's hypothesis is employed to calculate all three velocity gradients in the axial direction. The technique's resolution allows all terms of the velocity gradient tensor, hence strain rate tensor and kinetic energy dissipation, to be computed at each point within the plane. The data reveals that the vorticity field is dominated by high enstrophy tube-like structures. Conversely, the dissipation field appears to consist of sheet-like structures. Several criteria for isolating these strongly swirling vortical structures from the background turbulence were employed. One such technique involves isolating points in which the velocity gradient tensor has a real and a pair of complex conjugate eigenvectors. Once identified, the alignment of the various structures with relation to the vorticity vector and the real velocity gradient tensor eigenvector is investigated. The effect of the strain field on the geometry of the structures is also examined.

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