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Multi-scale geometry of flow structures in a flat-plate turbulent boundary layer IVAN BERMEJO-MORENO, Center for Turbulence Research, Stanford University, CALLUM ATKINSON, Laboratory for Turbulence Research in Aerospace and Combustion, Monash University, SERGEI CHUMAKOV, Center for Turbulence Research, Stanford University, JULIO SORIA, Laboratory for Turbulence Research in Aerospace and Combustion, Monash University, XIAOHUA WU, Royal Military College of Canada — We study the geometry of structures educed from the enstrophy and dissipation fields obtained from a DNS of a flat-plate turbulent boundary layer (J. Fluid Mech. 630, 5-41, 2009) following the non-local multi-scale methodology introduced in J. Fluid Mech. 603, 101-135, 2008. We compare the results with those of homogeneous isotropic turbulence. In the present analysis, geometric parameters are combined with physical quantities associated with the flow structures. Their evolution in time is studied through a series of snapshots obtained from the simulation, following a moving subdomain. Individual structures are tracked in time, relating their physical and geometric properties at the local and structure levels. The validity of two local identification criteria for the eduction of vortex tubes and sheets in wall-bounded flows is also evaluated.

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