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**Strong Thin Shear Layers in High Reynolds Number Turbulence**

TAKASHI ISHIHARA, Nagoya University, JST CREST, JULIAN C.R. HUNT, University College London, YUKIO KANEDA, Nagoya University — Data analysis of high resolution DNS of isotropic turbulence with the Taylor scale Reynolds number $R_\lambda = 1131$ shows that there are strong thin shear layers of thickness of the order of Taylor microscale, consisting of a cluster of strong vortex tubes. There are big velocity jumps of the order of the rms of the fluctuation velocity not only across the layers, but also over a small distance of order $10\eta$ ($\eta$ =the Kolmogorov length scale), due to the strong vortex tubes within the layers. On average there is a balance between the energy dissipation and the energy transfer within the layers where the most intense vortices and dissipation occur. The large fluctuation of the energy transfer implies that not only downscale energy transfer but also upscale energy transfer is very active at the regions adjacent the layer. The DNS data show that the layer as well as the surrounding is moving and there is a net contraction flow on opposite sides of the layer; the interface of the layer is sharper at the side where stronger contraction occurs. The DNS data are consistent with a picture that the downscale and the upscale energy transfers correspond respectively to small eddies being distorted inhomogeneously by larger eddies, as they impinge onto and separate from the thin shear layers.

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