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Mean shear regulates the intermittency of energy dissipation rate KHANDAKAR MORSHED, LAKSHMI DASI, Colorado State University — We studied the multi-fractal properties of the instantaneous fluctuations of the turbulent kinetic energy dissipation rate, ε in the strongly anisotropic flow past a backward facing step. Measurements correspond to time-resolved PIV at Reynolds number, Re= 13600, 9000, and 5500 based on the free stream velocity and step height. Results indicate a significant dependence of the intermittent dissipation rate signal with respect to Re and local mean shear, S. Probability analysis showed that the fluctuations in ε are less skewed around its mean in regions of intense shear. The frequency of relatively intense bursts of intermittent fluctuations in ε appear to be dependent on the magnitude of these events. Lacunarity, a measure that characterizes such magnitude and temporal scale dependent intermittency of fluctuating signals, revealed that intermittency in ε reduces with S across all temporal scales. However, the intermittency of ε appears to increase with burst magnitudes. We discuss the implications of these results on the established multi-fractal picture of small-scale turbulence and the effects of large scale anisotropy.

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