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Local dissipation scales in turbulent shear flows PETER HAMLINGTON, University of Colorado, Boulder — Recent studies of homogeneous isotropic turbulence and wall-bounded shear flows have indicated that dissipation of kinetic energy occurs over a broad range of scales, including scales significantly larger than the classical mean Kolmogorov scale. It is thus possible to construct a field of local dissipation scales by examining the local Reynolds number at every point in a flow. Distributions of the resulting scales have proven to be similar in the flows examined to date, although substantial variations are observed as the wall is approached in turbulent channel flow. These variations could be due to one or several effects in the near-wall region, including decreased Reynolds number, increased flow two-dimensionality, or increased mean shear. In this talk, the effect of mean shear on local dissipation scales is examined by analyzing direct numerical simulations of homogeneously sheared turbulence. The simulations are performed for a range of shear strengths and Reynolds numbers, and the resulting distributions of dissipation scales are compared. The implications of these results for wall-bounded flows are discussed, and the results are also used to test the validity of assumptions concerning local isotropy and scale separation in turbulent shear flows.

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