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Isotropy and inertial range behavior at pipe centerline CLAYTON BYERS, Trinity College, MATT FU, California Institute of Technology, IVAN MARUSIC, University of Melbourne, MARCUS HULTMARK, Princeton University — Isotropic relations form a cornerstone of turbulence research, but the exact extent of their validity in different flow configurations is always elusive. An investigation of multiple isotropic relations for high Reynolds number turbulence has been performed along the centerline of the Princeton Superpipe, a fully-developed turbulent pipe flow facility. Simultaneous measurements of the streamwise and radial component of velocity were acquired with a nanoscale crosswire, and the consistency of several different isotropic dissipation estimates was evaluated. The estimations indicate that isotropic dissipation relations can work in limited regions, and no universality is found at the moderate Reynolds numbers of the experiments performed. A correction to Kolmogorov's 4/5ths law for radial inhomogeneity is shown to be necessary for increasing separation of the structure functions but is less prominent with increasing Reynolds number.

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