Scale by scale assessment of the approach to isotropy in a turbulent shear flow PETER E. HAMLINGTON, WERNER J.A. DAHM, University of Michigan — The local isotropy hypothesis of Kolmogorov's 1941 universal equilibrium theory states that all turbulent flows approach an increasingly isotropic state at small scales, regardless of the large scale behavior of the flow. Here we present an assessment of this scale-by-scale approach to isotropy for various anisotropy metrics using data from dual-plane stereo PIV measurements in a turbulent shear flow at several outer scale Reynolds numbers Re_δ. Specifically we examine the existence of a power law scaling between any arbitrary anisotropy metric Q and wavenumber scale k. Such a scaling implies residual anisotropies even at the smallest turbulent scales, perhaps accounting for the unexpectedly large departures from local isotropy noted in several previous studies.

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