1059-76-68 **Huidan Yu*** (yudh123@yahoo.com), 148 Murdock Rd., Baltimore, MD 21212. *Lagrangian Refined Kolmogorov Similarity Hypothesis for Gradient Time-Evolution and Correlation in Turbulent Flows.*

We study the time evolution of velocity and pressure gradients in isotropic turbulence, by quantifying their auto-correlation functions and decorrelation time scales as one follows fluid particles in the flow. The Lagrangian analysis uses data in a public database generated using direct numerical simulation of the Navier-Stokes equations, at a Reynolds number $Re_\lambda = 430$. It is confirmed that when averaging over the entire domain, correlation functions decay on timescales on the order of the mean Kolmogorov turnover time scale, computed from the globally averaged rate of dissipation. However, when performing the analysis in different subregions of the flow, turbulence intermittency leads to large spatial variability in the decay time scales. Remarkably, excellent collapse of the auto-correlation functions is recovered when using the 'local Kolmogorov time-scale' defined using the locally averaged, rather than the global, dissipation-rate. This provides new evidence for the validity of Kolmogorov's Refined Similarity Hypothesis, but from a Lagrangian viewpoint that provides a natural frame to describe the dynamical time evolution of turbulence. (Received February 15, 2010)