Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Power Law Decay in High Intensity Turbulence TIMOTHY KOSTER, ALEJANDRO PUGA, BAOLONG NGUYEN, JOHN LARUE, Univ of California - Irvine — In the study reported herein, the region where the power decay law is applicable for active grid generated turbulence is found by an iterative approach which determines the largest range where the ratio of the dissipation from the power law and the dissipation from the temporal velocity derivative are unity. The square of the Taylor microscale, as noted by Batchelor (1953), is linearly related to downstream distance relative to the virtual origin and can be used in a straightforward manner to find the virtual origin. The fact that the decay of downstream velocity variance is described by a power law is shown to imply power law behavior for various other parameters such as the dissipation, the integral length scale, the Taylor microscale, the Kolmogorov microscale and the Taylor Reynolds number and that there is an algebraic relationship between the various power law exponents. Results are presented for various mean velocities to show the decay exponent as a function of the Taylor Reynolds number.

Timothy Koster
Univ of California - Irvine

Date submitted: 30 Jul 2015 Electronic form version 1.4