Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Reynolds Number Effects on Near-Source Turbulent Mixing in Pipe Flow TIMOTHY J. DWYER, JAMES GUILKEY, HOLLY OLDROYD, TIMOTHY A. BARBER, ERIC R. PARDYJAK, University of Utah — Transport and dispersion physics of turbulent pipe flow is of importance to many industrial processes as well as water quality and pollution dispersion studies. This experimental work examines Reynolds number (Re) effects on turbulent pipe flow mixing characteristics in the near field of a coaxial scalar injection. The experimental approach is designed to obtain simultaneous velocity and concentration field measurements using 2D PIV and planar light induced fluorescence (PLIF). The experimental apparatus consists of a recirculating pipe flow apparatus with a customized test section designed to limit laser light reflection. A number of turbulent pipe flow velocity and concentration studies are available in the literature, however few present combined data over a range of Reynolds numbers. This study provides velocity, concentration and covariance data for Re = 5300-60000 that are compared to previous work. Simultaneous mean and fluctuating velocity and concentration data are presented with a unique focus on the spatial variability of the turbulent fluxes of momentum and scalar concentration.

Timothy J. Dwyer
University of Utah

Date submitted: 02 Aug 2007 Electronic form version 1.4