

Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Measurements of the radial distribution function of inertial particles in turbulent flows. STEPHANIE NEUSCAMMAN, SATHYANARAYANA AYYALASOMAYAJULA, JUAN SALAZAR, SERGIY GERASHCHENKO, LANCE COLLINS, ZELLMAN WARHAFT, Cornell University — Inertial particles (particles with a higher density than that of the surrounding fluid) in turbulent flows cluster: they are ejected from regions of high vorticity and concentrate in regions of high strain. The Radial Distribution Function (RDF) [S. Sundaram and L.R. Collins, J. Fluid Mech. 335, 1997; R. A. Shaw et al, Q. J.R. Met. Soc. 128, 2002] is used to quantify clustering. Computations show that it peaks for particle separations in the dissipation range. Here we describe measurements of two-dimensional RDFs in decaying high Reynolds number wind tunnel turbulence. The turbulence is produced using an active grid and the inertial particles are generated by water sprays. For this poly-dispersed droplet distribution the size distribution is determined using a phase doppler particle analyzer. The particles are illuminated using a laser light sheet and their positions are obtained using high speed cameras downstream of the grid. Our results are compared with measurements using a phase doppler interferometer in the same flow, and with other recent measurements in box turbulence.

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Date submitted: 02 Aug 2007

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