Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Effect of Ambient Turbulence on the Drag Force of Particle at High Stokes Number MASAYA MUTO, NOBUYUKI OSHIMA, MAKOTO TSUBOKURA, Hokkaido University, TAKUJI NAKASHIMA, Hiroshima University — Velocity of solid particle (diameter is 2 mm) free-falling in a nearly isotropic turbulent airflow has been investigated using an ingenious experimental setup to achieve high Stokes number. Turbulent intensity around the particle is large enough to have eddies of comparable size to the thickness of boundary layer (approximately 0.2 mm) that is estimated in a laminar flow. As a result of measurement, an ensemble averaged particle velocity is larger than the velocity predicted with Schiller and Naumann's drag coefficient (Muto *et al.*, 2007). To investigate this reduction of drag force, flow aspects near the particle are observed using a numerical simulation of rotating spherical particle (periodically rotates in opposite direction) in a uniform flow. As a result, a modulation of drag force is found and it depends on period and amplitude of the rotation. A reason of the change of drag force in both experiment and numerical simulation is deduced that eddies included in an approach flow to particle, or periodic rotation of particle affect its boundary layer, and the wake of particle is suppressed.

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Date submitted: 03 Aug 2008 Electronic form version 1.4