Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Fully resolved DNS of freely moving finite-size particles in decaying isotropic turbulence SAID ELGHOBASHI, University of California, Irvine, ANTONINO FERRANTE, California Institute of Technology — The objective of the present study is to investigate the two-way coupling effects of freely moving *finite-size* solid particles on decaying isotropic turbulence. The particle diameter is of the order of the Taylor micro- scale of turbulence, λ, i.e. $d \sim \lambda > \eta$, and the volume fraction of particles $\phi_v \sim 0.1$. Our DNS employs an *immersed boundary method* to resolve the flow around each individual particle while simultaneously resolving the fluid motion at the Kolmogorov scale. The Navier-Stokes equations are solved throughout the whole domain (including the volumes occupied by the particles) on a Cartesian mesh. The number of the dispersed particles is 88 for $\phi_v = 0.01$, and 884 for $\phi_v = 0.1$. The density of the solid particles is 2.56 times that of the carrier fluid. The modifications of the decay rate and the spectrum of the turbulence kinetic energy and its dissipation rate are discussed.

Said Elghobashi
University of California, Irvine

Date submitted: 03 Aug 2007 Electronic form version 1.4