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DNS of fully resolved spherical particles dispersed in isotropic turbulence FRANCESCO LUCCI, University of California, Irvine, ANTONINO FERRANTE, California Institute of Technology, SAID ELGHOBASHI, University of California, Irvine — Our DNS study concerns the interactions between decaying isotropic turbulence and solid spherical particles with diameter, d, larger than the Kolmogorov length scale, η. We employ an Immersed Boundary method similar to that of Uhlmann (JCP, 2005) to resolve the flow around 6400 spherical particles with a volume fraction of $\phi_v = 0.1$. The monosize particles have a diameter, $d = 16\eta_o$. Our simulations, with 256^3 mesh points and $Re_{\lambda_0} = 75$, cover a range of $38 \leq \tau_p/\tau_{K_o} \leq 149$, for the ratio of the particle response time to the initial Kolmogorov time scale. A Lagrangian approach is used to compute the frequency spectrum of the turbulence kinetic energy (TKE) of the fluid phase. The effects of varying τ_p/τ_{K_o} on the spectrum and the decay rate of TKE are discussed. The effects of the formation of the particle boundary layer on the viscous dissipation rate of TKE are also discussed.

[X] Prefer Oral Session
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