Homogeneous and isotropic turbulence laden with particles of different Stokes numbers GEORGE MALLOUPPAS, BEREND VAN WACHEM, Imperial College London, WILLIAM GEORGE, Imperial College London, Exhibition Road, London SW7 2AZ — The interactions of homogeneous isotropic turbulence with particles of various Stokes numbers are examined. The talk focuses on a series of DNS of forced turbulence laden with discrete particles performed on a 128^3 periodic box. Several parameters are varied such as the Stokes number and the Taylor Reynolds number. The modification of one-point statistics due to the presence of particles is investigated. Moreover, the relation of forcing with light and heavy particles is investigated by evaluating the correlation coefficients between the forcing and the particles. It is shown that our newly proposed forcing scheme has a limited direct effect on the particles. An important consequence of the presence of the particles is the modification of the dissipation spectrum of the fluid, which depends on the particle Stokes number, and more surprisingly, on the Taylor Reynolds number. This is examined in view of the two-way coupling spectrum, which acts as a dissipative-transfer term. The dispersion of fluid and discrete particles are compared with analytical solutions by assuming the velocity autocorrelation function is of exponential form. Finally, the talk will address the importance of preferential concentration of the particles and its effect on the two-way coupling.

William George
Imperial College London

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