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Temperature fluctuations in numerical simulations of particle-laden isotropic turbulence with two-way coupling MAURIZIO CARBONE, Politecnico di Torino, ANDREW BRAGG, Duke University, MICHELE IOVIENO, Politecnico di Torino — The two-way coupling between fluid and particle temperature fluctuations in forced steady isotropic turbulence is investigated by means of direct numerical simulations with sub-Kolmogorov inertial particle Lagrangian tracking. The aim is to determine the sensitivity of the temperature field statistics to the presence of particles, parametrized by the Stokes number (St) and the thermal Stokes number (St_θ). As shown by Béc et al. (*PRL*, 2014), the inertia of particles enhances mixing and heat transfer because particles cluster in regions of sharp temperature gradients out of the Lagrangian coherent structures. This trend strongly affects the small-scale dynamics of the temperature field and the dissipation rate of the temperature variance. Moreover, in presence of a two-way coupling, the finite mass and heat capacity of particles allows them to carry temperature increments across the scales of the flow influencing the temperature statistics at all scales. The resulting non trivial behavior is highlighted by means of two-particle statistics and two-point statistics of the temperature field.

Maurizio Carbone
Politecnico di Torino

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