

Abstract Submitted
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Turbulence-radiation interactions in a particle-laden flow¹ ARI FRANKEL, HADI POURANSARI, GIANLUCA IACCARINO, ALI MANI, Stanford University — Turbulent fluctuations in a radiatively participating medium can significantly alter the mean heat transfer characteristics in a manner that current RANS models cannot accurately capture. While turbulence-radiation interaction has been studied extensively in traditional combustion systems, such interactions have not yet been studied in the context of particle-laden flows. This work is motivated by applications in particle-based solar receivers in which external radiation is primarily absorbed by a dispersed phase and conductively exchanged with the carrier fluid. Direct numerical simulations of turbulence with Lagrangian particles subject to a collimated radiation source are performed with a flux-limited diffusion approximation to radiative transfer. The dependence of the turbulence-radiation interaction statistics on the particle Stokes number will be demonstrated.

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