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Influence of thermal radiation on turbulent kinetic energy spectrum in particle-laden flows JACQUELINE CHEN, HEMANTH KOLLA, Sandia National Laboratories, Livermore, CA, HADI POURANSARI, ALI MANI, Stanford University — We investigate density-weighted spectra of turbulent kinetic energy of the gas phase in particle-laden flows with thermal radiation. Compressible DNS of three-dimensional homogeneous isotropic decaying turbulence laden with point particles reveal that thermal radiation alters the spectrum of the total turbulent kinetic energy by introducing dilatational velocity fluctuations at large wavenumbers, while the spectrum of the divergence-free modes remains unaffected. With increasing time the magnitude of the energy content in the dilatational modes increases while the wavenumber range over which they are active also broadens. Pressure-dilatation correlations, which are source-like terms in the balance equation for density-weighted energy spectrum, confirm the high-wavenumber influence of radiation-induced dilatation.

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