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A numerical study of subgrid-scale effects on solid particle motion and heat transfer in a dilute, particle-laden turbulent flow. SAENSUK WETCHAGARUN, JAMES RILEY, University of Washington, Seattle — The effects of carrier-phase, subgrid-scale (SGS) velocity and temperature on particle motion and heat transfer are investigated via *a priori* testing using direct numerical simulation (DNS). The carrier phase obeys the incompressible form of the Navier-Stokes equations. The flow is assumed to be dilute so that one-way coupling is implemented. The filtered carrier phase data for decaying, isotropic turbulence are obtained by filtering the output from the DNS. Particles are individually tracked, and their temperature and heat transfer with the local fluid is computed by solving an energy equation. Both the large-scale and the SGS fluid properties as 'seen' by the particle are computed directly from simulation results. It is found that, depending on the size of the filter and the local value of the Stokes number, the SGS motions can significantly affect the particle motion and the heat transfer. In addition, the SGS effects depend strongly on the Stokes number, something not included in some recent models. Improvements in the SGS modeling, based upon these numerical results, are suggested.

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