Simulations of dispersed turbulent multiphase flow

M.R. Maxey

Center for Fluid Mechanics, Turbulence and Computation, Brown University, Box 1966, 37 Manning Street Providence, RI 02912 USA USA

B.K. Patel

Center for Fluid Mechanics, Turbulence and Computation, Brown University, Box 1966, 37 Manning Street Providence, RI 02912 USA USA

E.J. Chang

Naval Research Laboratory, Code 6410 Washington, DC 20375 USA USA

L.-P. Wang

Department of Mechanical Engineering, University of Delaware Newark, DE 19716 USA USA

Direct numerical simulations of homogeneous isotropic turbulence are used to investigate the effects of turbulence on the transport of particles in gas flows or bubbles in liquid flows. The inertia associated with the bubbles or the particles leads to locally strong concentrations of these in regions of instantaneously strong vorticity for bubbles or strain-rate for particles. This alters the average settling rates and other processes. If the mass-loading of the dispersed phase is significant a random “turbulent” flow is generated by the particle settling. A simple demonstration of this is given, showing the statistically axisymmetric character of this flow and how it can modify an ambient turbulent flow.

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