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Feedback effect on the large-scale fluid motion in wall-bounded gas-solid disperse flow YOICHI MITO, Kitami Institute of Technology — Influence of the forces, exerted by dispersed particles, in a channel, in which gas is flowing turbulently, is examined using a direct numerical simulation to calculate the gas velocities seen by the particles and a point force method to calculate the forces exerted by the particles on the gas. Influence of gravity and inter-particle collisions is ignored. Distributions of the mean streamwise body forces, exerted on the fluid by the turbulence and by the particles, are calculated to show the mean large-scale motions of the fluid phase and of the disperse phase. The fluid turbulence forces decrease with increasing volume fraction to accommodate the inter-phase body forces. Thus the large-scale fluid motions, which make a major contribution to the fluid turbulence, are damped. The turbophoretic velocities, which represent the mean drifts, show that mean contribution of each particle to the mean large-scale motion of the disperse phase decreases with increasing volume fraction. This is caused by the decreases in the fluid turbulence and the turbulent transport, with increasing volume fraction.

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