Abstract Submitted
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Effect of particle inertia on fluid turbulence in gas-solid disperse flow[1] YOICHI MITO, Kitami Institute of Technology — The effect of particle inertia on the fluid turbulence in gas-solid disperse flow through a vertical channel has been examined by using a direct numerical simulation, to calculate the gas velocities seen by the particles, and a simplified non-stationary flow model, in which a uniform distribution of solid spheres of density ratio of 1000 are added into the fully-developed turbulent gas flow in an infinitely wide channel. The gas flow is driven downward with a constant pressure gradient. The frictional Reynolds number defined with the frictional velocity before the addition of particles, v_0^*, is 150. The feedback forces are calculated using a point force method. Particle diameters of 0.95, 1.3 and 1.9, which are made dimensionless with v_0^* and the kinematic viscosity, and volume fractions, ranging from 1×10^{-4} to 2×10^{-3}, in addition to the one-way coupling cases, are considered. Gravitational effect is not clearly seen where the fluid turbulence is damped by feedback effect. Gas flow rate increases with the decrease in particle inertia, that causes the increase in feedback force. Fluid turbulence decreases with the increase in particle inertia, that causes the increase in diffusivity of feedback force and of fluid turbulence.

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