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Feedback Effect of Dispersed Particles on Sustaining Mechanism of Wall Turbulence YOICHI MITO, Kitami Institute of Technology — The influence of interaction between particles and fluid turbulence on the latter, which is represented by Lagrangian time scales of the fluid turbulence seen by particles, has been considered using our recent findings on the scales of the fluid motions, that carry particles, in fully-developed turbulent fluid flow through a channel and the Lagrangian measurements, done in a direct numerical simulation of the turbulent fluid flow through a vertical channel where solid particles were ejected from uniformly distributed point sources, of which the latter were presented last APS-DFD meeting. Fluid turbulence is damped by the feedback forces exerted by particles and is damped further with increasing inertia of particles, that is, with increasing scales of particle motions. The increases in the scales of fluid motions in the fluid turbulence, that is being damped by addition of particles, reflect disappearance of small-scale fluid motions and resultant development of non-turbulent fluid motions. These indicate that small-scale fluid motions, such as vortices, are sustained by large-scale fluid motions and that the fluid turbulence is sustained by the multi-directionality and multi-dimensionality of large-scale fluid motions, which are enhanced by small-scale fluid motions.

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