Linear stability of a two-dimensional uniform fluidized bed

Osamu Hirayama
Tokyo University of Agriculture and Technology, Fuchu, Tokyo 183, Japan

Ryuji Takaki
Tokyo University of Agriculture and Technology, Fuchu, Tokyo 183, Japan

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Basic equations in a two-dimensional fluidized bed are constructed for the particle and the fluid phases, and linear stability to two-dimensional disturbances of the volume fractions and the velocities of both phases is analyzed. The diffusion of particles and an effective viscosity in the particle phase are considered. It was found that the inertia term due to the average fluid velocity is responsible for the instability, while the particle diffusion and the effective particle viscosity suppress the growth of disturbances. It was also found that the most unstable state has a vertical wavenumber vector.

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