

Singularity of particle-suspended turbulent flow

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The interaction between particles and coherent structures in turbulence needs to be investigated in order to understand the behavior of particles suspended in turbulent flow. However, it is quite difficult to describe the motion of particles mathematically. Thus, a new approach to understand the interaction between particles and background turbulence is proposed. This concept is obtained based on the assumption that particle motion can be described by a smooth function in space. Therefore, the particle velocity can be uniquely determined by the position of the particle, and thus flow of particle exists and can be examined to find the position of collision by tracking singularity of velocity gradient of particles. Using this concept, the singularity of velocity gradient for various Stokes number and gravity factors is investigated in a two-dimensional Taylor-Green vortex flow and two-dimensional turbulent flow. Detailed statistics of singularity in particle-laden turbulence will be discussed in the poster.