On the modification of particle dispersion in isotropic turbulence by free rotation of particle YONGNAM PARK, CHANGHOON LEE, School of Mechanical Engineering Yonsei University — Effect of a particle's spin is investigated numerically by considering the effect of lift occurring due to difference of rotations of a particle and of fluid such as the Saffman lift and Magnus force. These lift forces have been neglected in many previous works on particle-laden turbulence. The trajectory of particles can be changed by the lift forces, resulting in significant modification of the stochastic characteristics of heavy particles. Probability density functions and autocorrelations are examined of velocity, acceleration of solid particle and acceleration of fluid at the position of solid particle. Changes in velocity statistics are negligible but statistics related with acceleration are a little bit changed by particle's rotation. When a laden particle encounters with coherent structures during the motion, the particle's rotation might significantly affects the motion due to intermittently large fluid acceleration near coherent structures. The result can be used for development of stochastic model for particle dispersion. Detailed physical interpretation will be presented in the meeting.

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