Effect of inter-particle collision in particle-laden homogeneous isotropic turbulence OHJOON KWON, CHANGHOON LEE, Yonsei University — It has been known that Inter-particle collision of small spherical particles in particle laden homogeneous isotropic turbulence modifies the statistical characteristics of particle behaviour. For example, the dispersion of heavy particles is decreased by this collision effect (Lavieville 1997). Still, the mechanism of interaction between particle's collision and turbulence is not clear. Direct numerical simulations are performed for particle-laden isotropic turbulence by adopting a spectral method, and the 4th-order Hermite interpolation is used for tracking particles. Inter-particle collision is considered as a complete energy conserved elastic process. Because the collision-induced particle acceleration is not quite related with the particle's current-state properties and this irrelevance becomes dominant as the Stokes number increases, there are some significant statistical modifications observed in the behaviour of high Stokes number particles. We found that the particle velocity integral time scale decreases as the Stokes number becomes larger due to enhanced interference due to collision. Furthermore, the particle dispersion is suppressed for the same reason. The particle concentration tendency is also slightly mitigated due to the presence of particle volume and by collision. But there is no clear evidence about the variation of particle velocity variance. More detailed results will be presented in the meeting.

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