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A priori test of particle clustering effect on subgrid modeling WEN WANG, SHANKAR SUBRAMANIAM, RICHARD H. PLETCHER, YING XU, RAHUL GARG, MADHUSUDAN PAI, Iowa State University — Large eddy simulation has been widely used to study turbulent particle-laden flows in isotropic turbulence, channel flow and even complex engine flows. Subgrid scale models of interphase momentum transfer depend on particle size and response time. However, in most flows preferential concentration causes particle clustering, which introduces new length scales that need to be considered in a two-phase LES subgrid model. In this talk, we will first present the new length scales introduced by particle clusters and their relationship with flow and filter scales in a homogeneous isotropic turbulent flow field. Then the filtered flow field and interphase force field based on both cluster length scales and flow scales will be analyzed and the effect of particle Stokes number will be addressed. This result will provide a basis for a new subgrid scale model for large eddy simulation of turbulent particle-laden flows.

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