

Abstract Submitted
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Large-eddy simulation of turbulent collision of heavy particles in isotropic turbulence GUODONG JIN, GUOWEI HE, State Key Laboratory for Nonlinear Mechanics, Institute of Mechanics, Chinese Academy of Sciences — The small-scale motions relevant to the collision of heavy particles represent a challenge to LES of turbulent particle-laden flows. We examine the capability of the LES method to predict the collision-related statistics such as the collision rate for a wide range of particle Stokes numbers. It is shown that, without the SGS motions, LES cannot accurately predict the particle-pair statistics for heavy particles with small and intermediate Stokes numbers. The errors from the filtering operation and the SGS model are evaluated separately using the filtered-DNS (FDNS) and LES flow fields. The errors increase with the filter width and have nonmonotonic variations with the particle Stokes numbers. It is concluded that the error due to filtering dominates the overall error in LES for most particle Stokes numbers. It is found that a particle SGS model must include the effects of SGS motions on the turbulent collision of heavy particles for $St_k < 3$. For more details please refer to Phys. Fluids 22, 055106 (2010).

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