Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

An unstructured overset method for particle-resolved simulation of particle-laden flows[1] WYATT HORNE, KRISHNAN MAHESH, University of Minnesota — Particle-laden flows involve a large range of length scales, ranging from the larger convective length scales down to length scales smaller than particle size. We develop a particle-resolved direct-numerical simulation (PR-DNS) method to enable the accurate study of the physics of particle-laden flow at particle length scales. Unstructured meshes are attached directly to particle surfaces and to the background flow field. The different meshes are allowed to arbitrarily overlap with each other to create a single cohesive solution. A dynamic connectivity procedure is used that cuts solid bodies out of each mesh and establishes interpolation pairs between overlapping meshes. The flow is incompressible, and the numerical method is based on that developed by Mahesh et al. [J. Comput. Phys. (2004) 197:215-240]. The overall discrete conservation properties for mass, momentum and kinetic energy are analyzed. Several cases are presented showing the method's efficacy for studying particle-laden flow including single particle results and particle-to-particle interaction.

[1]This work is supported by the DOE.

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Date submitted: 24 Jul 2014 Electronic form version 1.4