Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Particle-Resolved Direct-Numerical Simulation of Turbulent Particle-Laden Flows Using Unstructured Overset Meshes[1] WYATT HORNE, KRISHNAN MAHESH, Univ of Minn - Minneapolis — Particle-laden turbulent 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]. Several cases are presented illustrating the method's efficacy for studying particle-laden flow. Included are cases featuring freely moving particles within turbulent fluid flow.

[1]This work is supported by the DOE.

Wyatt Horne
Univ of Minn - Minneapolis

Date submitted: 29 Jul 2015 Electronic form version 1.4