Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Development of high order numerical methods for particle-laden flows on unstructured grids: A realizability-preserving Discontinuous Galerkin method for moderate Stokes number flows ADAM LARAT, MACOLE SABAT, EM2C-Ecole Centrale Paris, AYMERIC VIÉ, Center for Turbulence Research, CHRISTOPHE CHALONS, Université de Versailles Saint-Quentin, MARC MASSOT, EM2C-Ecole Centrale Paris — The simulation of particle-laden flows is of primary importance for several industrial applications, like sprays in aeronautical combustors or particles in fluidized beds. Our focus is on Moment methods that describes the disperse phase as a continuum. The accuracy and performance of such approaches highly depends on the number of controlled moments for correctly describing the physics of the flow, but also on the numerics that are used to solve the continuous system of equations at a discrete level. In the present work, we investigate the use of Discontinuous Galerkin methods to solve for the convective part of the moment equations. By deriving realizability conditions on the moment system that are associated to a convex space, a projection strategy is used to maintain the solution in the realizable space. This method is applied to the resolution of the pressure less gas dynamics and the Anisotropic Gaussian moment approach, the former solving for low Stokes number flows where no Particle Trajectory Crossing occurs, while the latter is solving for moderate Stokes number flows and can handle PTC through a pressure tensor in the convective term. The strategy is assessed on turbulent flows through comparisons with Lagrangian results.

Aymeric Vié
Center for Turbulence Research

Date submitted: 01 Aug 2014 Electronic form version 1.4