Numerical Simulation and Coarse Graining of Momentum, Heat and Mass Transfer in Dense Gas-particle Suspensions

Abstract:
Accurate prediction of dispersed multiphase flows is a central topic in many areas of science and engineering, from oil & gas applications to the study of river beds and blood flows. However, due to the large number of relevant spatio-temporal scales involved, it is generally not possible to resolve the fine details of the fluid-particle system and approximate (generally unclosed) models are often employed that describe systems with dynamic properties varying at some larger scales. There are generally termed as “unresolved” models. One example is the Particle Unresolved Euler-Lagrange (PU-EL) model, where the fluid flow is described at length scales larger than the characteristic particle diameter and particles (or group of particles named “parcels”) are tracked separately. This method is very appealing since it allows to track the thermal and chemical history of each particle as well as resolving intra-particle phenomena. Another popular method is the Two Fluid Euler Euler (TF-EE) method, where the particle and fluid phases are modeled as interpenetrating continua. Such method has been recently extended to model even larger systems by mean of a Filtered Two Fluid Euler Euler (FTF-EE) formulation, where inhomogeneous structures like clusters and anisotropic drag laws are taken into account in the constitutive laws of the dispersed phase.

Bio:
Dr. Municchi obtained his Bachelor and Master degrees at the University of Bologna (Italy) in Energy and Nuclear Engineering. He worked at the Graz University of Technology (Austria) with Prof. Stefan Radl where he earned a Ph.D. in Chemical and Process Engineering with focus on numerical simulations and closure development of dispersed multiphase flows.

Faculty Hosts: Professors Luciano Castillo, and Thomas Siegmund. PIZZA will be provided!