Interface Resolution in Multiphase Flow

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The development of numerical methods to model the hydrodynamic interaction of reactive materials with their surroundings will be presented. Energetic materials often consist of a complex compressible non-equilibrium mixture of gases and particles. The multiphase character of this mixture must be taken into account when developing models. However, the types of methods typically used to handle the multiphase material are not necessarily the techniques best suited to accurately predict the response of the pure neighboring material. Therefore, the algorithms employed must be able to resolve the sub-scale interfaces embedded within the multiphase mixture as well as its interface with the surrounding regions.

An Eulerian fluid-particle multiphase model is presented. This model is based on the Discrete Equations Method (DEM) as presented in Chinnayya et al. [J. Comput. Phys. 196 (2004) 490]. Modifications were made to resolve the interface between the multiphase and pure materials. These modifications were integrated into the Riemann solver to more accurately resolve the contact surface. A number of techniques were attempted and will be presented along with descriptions of the methods and comparisons of results.