Abstract Submitted
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A Parallel Geometry and Mesh Infrastructure for Explicit Phase Tracking in Multiphase Problems[1] FAN YANG, ANIRBAN CHANDRA, YU ZHANG, EHSAN SHAMS, Rensselaer Polytechnic Institute, SAURABH TENDULKAR, ROCCO NASTASIA, Simmetrix Inc., ASSAD OBERAI, MARK SHEPHARD, ONKAR SAHNI, Rensselaer Polytechnic Institute — Numerical simulations with explicit phase/interface tracking in a multiphase medium impact many applications. One such example is a combusting solid involving phase change. In these problems explicit tracking is crucial to accurately model and capture the interface physics, for example, discontinuous fields at the interface such as density or normal velocity. A necessary capability in an explicit approach is the evolution of the geometry and mesh during the simulation. In this talk, we will present an explicit approach that employs a combination of mesh motion and mesh modification on distributed/partitioned meshes. At the interface, a Lagrangian frame is employed on a discrete geometric description, while an arbitrary Lagrangian-Eulerian (ALE) frame is used elsewhere with arbitrary mesh motion. Mesh motion is based on the linear elasticity analogy that is applied until mesh deformation leads to undesirable cells, at which point local mesh modification is used to adapt the mesh. In addition, at the interface the structure and normal resolution of the highly anisotropic layered elements is adaptively maintained. We will demonstrate our approach for problems with large interface motions. Topological changes in the geometry (of any phase) will be considered in the future.

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Onkar Sahni
Rensselaer Polytechnic Institute

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