

# **A Multimaterial ALE method on a Multilevel Mesh**

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## **ABSTRACT**

We have developed a numerical method for multimaterial hydrodynamics on a multilevel ALE(arbitrary Lagrangian Eulerian) mesh. ALE hydrodynamic calculations are divided into three steps – Lagrangian step, grid relaxation, and advection. A material interface is tracked by advecting the volume fraction of each material. We introduce a multilevel mesh in order to resolve local features efficiently and to overcome the difficulty with large aspect ratio zones on a single-level ALE mesh.

A multilevel mesh is composed of blocks of mesh by allowing a grid refinement factor at the boundary of blocks. A stable numerical technique is developed to solve ALE equations at the block boundary between fine and coarse mesh. We will also describe a simple method to allow the material interface to cross the multilevel block boundary.

Test results will be presented to address basic numerical issues (wave reflection at the block boundary, symmetry preservation, numerical perturbation, and conservation) and to show the strengths of the multilevel mesh technique.