

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Efficient, Discretely Conservative Multi-Material Phase Transport on Unstructured Meshes Using the Interface Reconstruction Library¹ ROBERT CHIODI, Cornell University, PETER BRADY, NEIL CARLSON, Los Alamos National Laboratory — The Truchas Multiphysics solver was developed at Los Alamos National Laboratory in order to simulate advanced metal casting processes of exotic materials. These processes involve complicated mold geometries that require the use of unstructured meshes in order to adequately resolve the shape of the mold. To enable the accurate simulation of the filling of these molds with liquid metal, we have implemented an unsplit geometric multi-material volume of fluid method capable of individually tracking the many constituent ingredients involved in metal casting. This was done using a newly developed, open-source library, the Interface Reconstruction Library, which handles the difficult computational geometry and interface reconstruction methods needed in geometric volume of fluid methods. In this talk, we will detail how to implement an efficient algorithm for discretely conservative multi-material phase advection on unstructured meshes. Its computational performance and solution accuracy on both hexahedron and tetrahedron meshes will be compared to the current state-of-the-art for a suite of canonical test cases. This abstract is approved for release under LA-UR-19-27091.

¹Los Alamos National Laboratory is operated by Triad National Security, LLC, for the National Nuclear Security Administration of the U.S. Department of Energy (Contract No. 89233218CNA000001)

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Date submitted: 23 Jul 2019

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