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Intersection-Based ALE for Radiation Hydrodynamics PATRICK PAYNE, MARC CHAREST, HYEONGKAE PARK, Los Alamos National Laboratory — Many of the existing methods for Lagrangian hydrodynamics utilize staggered-grid hydrodynamic (SGH) algorithms. However, the fact that the momentum is defined by a nodal- and cell-centered quantity makes it difficult to implementing exact, intersection-based remapping schemes that conserve momentum. Cell-centered hydrodynamics (CCH) eliminates these complications by storing all of the quantities at the cell-centers. By coupling a CCH method with a high-order, cell-centered radiation transport method provides a unique opportunity for modeling problems with complex and evolving geometries that contain high amounts of mesh deformation. By storing all quantities at the cell center, we can use an exact, intersection-based remapping algorithm and avoid complications introduced by nodal quantities. This algorithm avoids tangling and improves mesh quality. To the authors knowledge, these three elements are yet to be coupled in any existing framework. The work presented here details the implementation and challenges of coupling CCH, high-order radiation transport, and exact intersection-based remapping schemes. In addition, we present results from simulations of inertial confinement fusion using these elements and discuss the potential features that are made viable by the use of exact, intersection-based schemes, like mesh overlaying.

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