Abstract Submitted
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An arbitrarily high-order, conservative, Cartesian-grid interface tracking scheme for multiphase flow simulations[1] BRYCE CAMPBELL, Lawrence Livermore National Laboratory — This work describes a newly developed conservative, high-order, Cartesian-grid method for tracking the interface in a multiphase flow. An efficient reconstruction scheme is proposed that utilizes the volume fraction field to generate a b-spline approximation for the interface. This interface representation is globally conservative, and analytical differentiation of the spline allows for the interfacial normal vectors and curvatures to be obtained directly. A separate algorithm is proposed that conservatively advects the interface due to an arbitrary (compressible/incompressible) velocity field. These reconstruction and advection methods have been successfully tested against the standard benchmark problems such as the: advection of a circle in uniform or corner flows, vortex-in-a-box, and collapsing/imploding circle tests. Together, the proposed reconstruction and advection techniques can achieve arbitrarily high (user specified) mesh convergence rates and conserve to within machine precision accuracy. The two-dimensional formulation may be easily extended to the more general three-dimensional problem.

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