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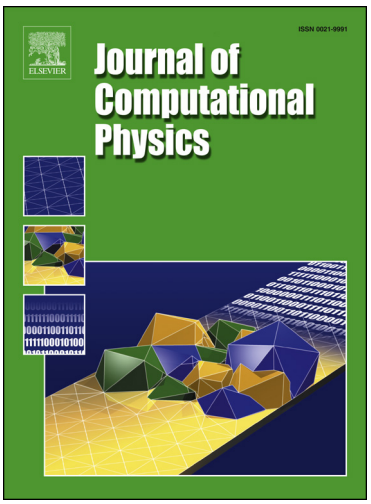

Conservative and bounded volume-of-fluid advection on unstructured grids

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Highlights

- A novel Eulerian-Lagrangian piecewise-linear interface calculation (PLIC) volume-of-fluid (VOF) advection method, which is three-dimensional, unsplit, and discretely conservative and bounded is proposed.
- As compared to contemporary unsplit VOF advection schemes, the proposed algorithm satisfies conservation and boundedness of the liquid volume fraction irrespective of the underlying flux polyhedron geometry, which gives the developer the freedom to control the accuracy, cost and robustness of the approach through their choice in flux polyhedron geometries.
- Flux polyhedra that fit within this bounded and conservative unsplit VOF scheme's framework and vary in geometric complexity as well as closeness to the true streak tube are proposed
- Canonical kinematic test cases on various two- and three-dimensional unstructured meshes demonstrate, depending on the choice in flux polyhedron geometry, accuracies ranging from zeroth to second order and calculation times that differed by orders of magnitude.
- For the flux polyhedra geometries that demonstrate second-order accuracy on all tests and meshes, the method's cost was comparable to the traditional topologically complex second-order accurate VOF advection scheme.