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Extension of the Mass-Conserving Level-Set method to unstructured polyhedral control volumes for two-phase flows FAHIM RAEES, DUNCAN R. VAN DER HEUL, KEES VUIK, Delft University of Technology — In this research, we present the Mass-Conserving Level-Set method (MCLS) for the simulation of two-dimensional, incompressible, immiscible two-phase flows, using a discretisation scheme that can accurately and efficiently handle domains of arbitrary geometrical complexity. The level set and the volume of fluid fraction are evolved at each time step on unstructured triangular grids. The Higher-Order Discontinuous Galerkin finite element method is used for spatial discretisation of the level set advection equation. The volume of fluid fraction advection is done in geometrical manner using Lagrangian-Eulerian method. This method is accurately mass conserving and easy to implement on unstructured grids. Also, it avoids overlapping regions during the volume of fluid fraction advection. The advected level set is corrected locally to make it mass conserving by the means of an explicit, invertible relation between the local level set and the volume of fluid fraction. This relation is termed as a Volume-of-Fluid function. The results show that proposed method is accurately mass conserving. Also, higher-order convergence is highlighted with this method on unstructured grids for the different test cases.

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