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Evaluating curvature for the volume of fluid method via interface reconstruction[1] FABIEN EVRARD, FABIAN DENNER, BEREND VAN WACHEM, Imperial College London — The volume of fluid method (VOF) is widely adopted for the simulation of interfacial flows. A critical step in VOF modelling is to evaluate the local mean curvature of the fluid interface for the computation of surface tension. Most existing curvature evaluation techniques exhibit errors due to the discrete nature of the field they are dealing with, and potentially to the smoothing of this field that the method might require. This leads to the production of inaccurate or unphysical results. We present a curvature evaluation method which aims at greatly reducing these errors. The interface is reconstructed from the volume fraction field and the curvature is evaluated by fitting local quadric patches onto the resulting triangulation. The patch that best fits the triangulated interface can be found by solving a local minimisation problem. Combined with a partition of unity strategy with compactly supported radial basis functions, the method provides a semi-global implicit expression for the interface from which curvature can be exactly derived. The local mean curvature is then integrated back on the Eulerian mesh. We show a detailed analysis of the associated errors and comparisons with existing methods. The method can be extended to unstructured meshes.

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