Estimation of curvature from volume fractions using parabolic reconstruction on two-dimensional unstructured meshes

(Supporting Data)

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The data presented in Section 5 of the manuscript [1] is gathered in 12 text files named:

`errors_{#}_{$}.txt`

- {$} corresponds to the test-case under consideration (see Fig. 9 of the manuscript):
  - `circle` for the circular interface
  - `ellipse` for the elliptical interface
  - `sinwave001` for the sin wave with an amplitude to wavelength ratio $\eta/\lambda = 0.01$
  - `sinwavw025` for the sin wave with an amplitude to wavelength ratio $\eta/\lambda = 0.25$
- {#} corresponds to the type of mesh employed (see Fig. 10 of the manuscript):
  - `hex` for a Cartesian mesh
  - `tri` for a triangular mesh
  - `poly` for a polygonal mesh

Each file contains the following columns:

- `RDX`: ratio $1/\kappa_{\text{ref}}\Delta x$ defined in the manuscript
- `NCONVERGED`: amount of interfacial cells where the parabolic reconstruction problem has converged
- `NINTERPP`: amount of interfacial cells where curvature was integrated from neighbour parabolas
- `NINTERPAVG`: amount of interfacial cells where curvature was interpolated from the neighbour cells
- `LINF`: maximum curvature error using the method proposed in the manuscript
- `LINFCSF`: maximum curvature error using the convoluted volume fraction method [2]
- `LINFRDF`: maximum curvature error using the reconstructed distance function method [3]
- `LINFHF`: (only in `hex` files) maximum curvature error using the height-funtion method [4]
- `L2`: rms of the curvature errors using the method proposed in the manuscript
- `L2CSF`: rms of the curvature errors using the convoluted volume fraction method [2]
- `L2RDF`: rms of the curvature errors using the reconstructed distance function method [3]
- `L2HF`: (only in `hex` files) rms of the curvature errors using the height-funtion method [4]

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References

[1] F. Evrard, F. Denner and B. van Wachem, Estimation of curvature from volume fractions using parabolic reconstruction on two-dimensional unstructured meshes, J. Comput. Phys. (2017).

[2] F. Denner and B. van Wachem, Fully-coupled balanced-force VOF framework for arbitrary meshes with least-squares curvature evaluation from volume fractions, Numer. Heat Transf., Part B, Fundam. 65 (2014) 218–255.

[3] S. Cummins, M. Francois and D. Kothe, Estimating curvature from volume fractions, Comput. Struct. 83 (2005) 425–434.

[4] S. Popinet, An accurate adaptive solver for surface-tension-driven interfacial flows, J. Comput. Phys. 228 (2009) 5838–5866.