

A High-Order Sharp Interface Method with Contact Line Singularities

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When distinct phases interact, contact lines occur. Characteristically, singularities are observed at the contact lines, e.g. a jump in pressure or varying surface tensions. This offers a significant obstacle for high order methods, where generally smooth functions are required to obtain a high order of convergence. By introducing a flexible discontinuous polynomial ansatz space, we overcome this restriction. We construct an extended discontinuous Galerkin (XDG) method that resolves contact line discontinuities while maintaining a high order of convergence.

We will briefly summarize the XDG method, concentrating on one of its pillars: the level set function. The zero isocontour of the level set function implicitly defines the surfaces of the contact lines. We will focus on two central components: first, contact line regularization and evolution and second, quadrature methods for surfaces and volumes with singularities.

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