Convergence of the Allen-Cahn equation to the mean curvature flow with 90° contact angle

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We consider the sharp interface limit of the Allen-Cahn equation with homogeneous Neumann boundary condition in 2D, when a diffuse interface has developed and intersects the boundary of the domain. Here a small parameter in the equation, which is related to the thickness of the diffuse interface, is sent to zero. The limit problem is given by mean curvature flow with a 90° contact angle condition and convergence using strong norms is shown for small times. Based on a curvilinear coordinate system and asymptotic expansions we construct an approximate solution for the Allen-Cahn equation and estimate the error with a spectral estimate for the linearized Allen-Cahn operator.

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References

[1] H. Abels, and M. Moser, Convergence of the Allen-Cahn Equation to the Mean Curvature Flow with 90° Contact Angle in 2D. Submitted. arXiv:1806.02065