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Geometric Flows and Phase Transitions in Heterogeneous Media

We present the first unconditional convergence results for an Allen-Cahn type bi-stable reaction diffusion equation in a periodic medium. Our limiting dynamics are given by an analog for anisotropic mean curvature flow of the formulation due to Ken Brakke. As an essential ingredient in the analysis, we obtain an explicit expression for the effective surface tension, which dictates the limiting anisotropic mean curvature. This allows us to demonstrate the regularity and uniform ellipticity of the limiting surface tension.

This is joint work with Riccardo Cristoferi (Radboud University, NL), Adrian Hagerty (Edge Case Research), Cristina Popovici, and Rustum Choksi (McGill), Jessica Lin (McGill), Raghavendra Venkatraman (CMU).