
Optimal convergence rates via distance, energy, and dissipation

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Abstract

A result of Brezis delivers optimal decay rates of energy and dissipation for a gradient flow with respect to a convex energy. In joint work with Felix Otto we seek corresponding results in the nonconvex case. The first idea is to use a perturbed version of the natural algebraic and differential relationships in the mildly nonconvex setting. We apply this framework to derive decay rates for the 1-d Cahn Hilliard equation on the line. The second idea is to do even better by observing that the ODE argument of Brezis does not require positive definiteness of the full Hessian, but only positive definiteness in suitable directions. We apply this idea in the setting of the 2-d Mullins Sekerka evolution.

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