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Spectra of Functionalized Operators Arising from Hypersurfaces

Abstract

Functionalized energies, such as the Functionalized Cahn-Hilliard, model phase separation in amphiphilic systems, in which interface production is limited by competition for surfactant phase, which wets the interface. This is in contrast to classical phase-separating energies, such as the Cahn-Hilliard, in which interfacial area is energetically penalized. In binary amphiphilic mixtures interfaces are characterized by bilayers, which divide the domain of the dominant phase, A, via thin layers of phase B formed by homoclinic connections. Evaluating the second variation of the Functionalized energy at a bilayer interface yields a functionalized operator. We characterize the center-unstable spectra of Functionalized operators and obtain resolvent estimates to the operators associated with gradient flows of the Functionalized energies. This is an essential step to a rigorous reduction to a sharp-interface limit.

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