On Nonlocal Isoperimetric and Cahn-Hilliard Problems

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Abstract

We study a nonlocal perturbation of the volume constrained perimeter problem and the Cahn-Hilliard problem. These variational problems are related to modelling microphase separation of diblock copolymers but can simply be viewed as mathematical paradigms for energy-driven pattern formation induced by competing short and long-range interactions.

I will discuss issues pertaining to length scales and periodicity, the consequences of stability, and dynamics to equilibrium. If times permits, I will also discuss some vector-valued nonlocal functionals related to copolymer-homopolymer blends.

The majority of the talk will consist of joint work with G. Alberti (Pisa) and F. Otto (Bonn), and joint work with P. Sternberg (Indiana).