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Nucleation of ordered microphases in fluctuation-induced first-order phase transitions MICHAEL CARILLI, GLENN FREDRICKSON, KRIS DELANEY, University of California Santa Barbara — The Landau-Brazovskii model is a field-based Hamiltonian describing a variety of systems which exhibit ordered microphases defined by characteristic periodicity and symmetries (e.g., lamellar, hexagonal, body-centered cubic). Interestingly, this model can undergo a fluctuation-induced first-order phase transition: for the symmetric model, the disorder-to-lamellar transition is second-order at the mean-field level but takes on first-order character when fluctuations are added. A disordered phase supercooled to within the resulting metastable region will then transition to the stable lamellar phase via nucleation. We demonstrate it is possible to discover the critical nucleus' size and geometry by applying the numerical string method[1] to a renormalized Landau-Brazovskii Hamiltonian which incorporates the effects of fluctuations. We find good agreement with predicted nucleus size and shape obtained by analytic approximation. Hohenberg and Swift[2] predict that for this transition, certain defect structures in the critical nucleus might act to lower the nucleation free energy barrier; we present a search for these structures.

[1]Weinan E et al, J. Chem. Phys. **126**, 164103 (2007)
[2]P. C. Hohenberg and J. B. Swift, Phys. Rev. E **52**, 1828 (1995)

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