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Field-Theoretic Simulations of Bicontinuous Microemulsions in Polymer Blends KRIS DELANEY, GLENN FREDRICKSON, UC Santa Barbara — Long diblock copolymers introduced into a blend of thermodynamically incompatible homopolymers can act as a surfactant to supress macroscopic phase separation of the blend. As the fraction of diblock copolymer is varied, an isotropic Lifshitz tricritical point is observed in the mean-field equations, demarking the crossover from macrophase to microphase separation. Close to the Lifshitz point, fluctuations are strong enough to supress the low-temperature formation of a well-ordered microphase leading to the appearance of a long-lived bicontinuous microemulsion characterized by micron-scale continuous domains. In this work, we discuss computational strategies for simulating the equilibrium formation of the microemulsion using field-theoretic methods. We address the challenges involved with accurately localizing the order-disorder transition in a fluctuating theory, and the handling of strong fluctuations close to the Lifshitz point.

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