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*Ideal and Defective Solutions to a Free Boundary Problem from Block Copolymer Morphology*

The Ohta–Kawasaki density functional theory of diblock copolymers gives rise to a nonlocal free boundary problem. In a proper parameter range an equilibrium pattern of many droplets is proved to exist in a general planar domain. A sub-range is identified where the multiple droplet pattern is stable. A defective ring pattern solution is also found. The importance of the the resonance condition is carefully studied.