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Mean-field Density Functional Theory of Triple Junction[1] CHANG-YOU LIN, MICHAEL WIDOM, ROBERT F. SEKERKA, Department of Physics, Carnegie Mellon University, Pittsburgh, PA 15232, USA — A triple junction in a three-phase fluid system is modeled by a mean-field density functional theory. We use a variational approach to find the Euler-Lagrange equations. Analytic solutions are obtained in the two-phase regions at large distances from the triple junction. We employ a triangular grid and use a successive over-relaxation method to find numerical solutions in the entire domain for the special case of equal interfacial tensions for the two-phase interfaces. We use the Kerins-Boiteux formula to obtain a line tension associated with the triple junction. This line tension turns out to be negative. We associate line adsorption with the change of line tension as the governing potentials change.

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