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Determination of Inter-Phase Line Tension in Langmuir Films¹ ELIZABETH K. MANN, LU ZOU, Kent State University, JACOB R. WINTER-SMITH, ANDREW J. BERNOFF, Harvey Mudd College, JAMES C. ALEXAN-DER, J. ADIN MANN, JR., Case Western Reserve University, PREM BASNET, EDGAR E. KOOIJMAN, Kent State University — The hydrodynamic response of a thin fluid film, whether a Langmuir monolayer at the air/water interface or a cell membrane, is difficult to model, since it involves the coupling of both bulk and surfaces phases. However, such hydrodynamic response is not only intrinsically critical for transport within the layer, it also provides the major available means to evaluate an important parameter for phase-separated layers, the line tension. We have developed a line-integral formulation of the hydrodynamic response of phase-separated layers with short-ranged forces, and tested it by comparisons between numerical simulations based on this model and experiment. These experiments both validate the model and demonstrate that the line tension can be determined with unprecedented accuracy and precision. Two systems have been studied to date: a simple smectic liquid crystal multilayer and coexistence between phases in binary lipid/cholesterol mixed layers. For the latter case, long-range dipole-dipole interactions are introduced into the model.

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Elizabeth Mann Kent State University

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