Abstract Submitted
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Phase equilibria in polymer-blend thin films NIGEL CLARKE, MIREILLE SOUCHE, Durham University — To describe equilibrium concentration profiles in thin films of polymer mixtures, we propose a Hamiltonian formulation of the Flory-Huggins-de Gennes theory describing a polymer blend thin film. We first focus on the case of 50:50 polymer blends confined between anti-symmetric walls. The different phases of the system and the transitions between them, including finite size effects, are systematically studied through their relation with the geometry of the Hamiltonian flow in phase space. This method provides an easy and efficient way, with strong graphical insight, to infer the qualitative physical behavior of polymer blend thin films. The addition of a further degree of freedom in the system, namely a solvent, may result in a chaotic behavior of the system, characterized by the existence of solutions with exponential sensitivity to initial conditions. Such solutions and there subsequent contribution to the out-of-equilibrium dynamics of the system are well described in Hamiltonian formalism. A fully consistent treatment of the Flory-Huggins-de Gennes theory of thin film polymer blend solutions, in the spirit of the Hamiltonian approach will be presented. 1. M. Souche and N. Clarke, J. Chem. Phys., submitted.

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