

Abstract Submitted
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Confinement effects in premelting dynamics SATYAJIT PRAMANIK, NORDITA, JOHN WETTTLAUFER, NORDITA, Yale University and University of Oxford — We examine the effects of confinement on the dynamics of premelted films driven by thermomolecular pressure gradients. Our approach is to modify a well-studied setting in which the thermomolecular pressure gradient is driven by a temperature gradient parallel to an interfacially premelted elastic wall. The modification treats the increase in viscosity associated with the thinning of films studied in a wide variety of materials using a power law and we examine the consequent evolution of the elastic wall. We treat (i) a range of interactions that are known to underlie interfacial premelting and (ii) a constant temperature gradient wherein the thermomolecular pressure gradient is a constant. The difference between the cases with and without the proximity effect arises in the volume flux of premelted liquid. The proximity effect increases the viscosity as the film thickness decreases thereby requiring the thermomolecular pressure driven flux to be accommodated at larger temperatures where the premelted film thickness is the largest. Implications for experiment and observations of frost heave are discussed.

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