

Abstract Submitted  
for the DFD14 Meeting of  
The American Physical Society

**Instabilities of evaporating non-isothermal ultra-thin film with insoluble surfactant** ALEXANDER MIKISHEV, Sam Houston State Univ, ALEXANDER NEPOMNYASHCHY, Technion-IIT — The stability of an evaporating ultra-thin liquid layer with insoluble surfactant spreading over a free deformable interface is investigated within lubrication theory. The evaporation process is described by 2D one-sided model based on the assumptions of density, viscosity and thermal conductivity of the gaseous phase being small compared to the same properties of the liquid phase. It is assumed that the thermal resistance to the evaporation at the interface is an increasing linear function of surfactant concentration. The evaporation mass flux depends on the interface temperature and vapor pressure. Using the long-wave approach and assumption of slow time evolution, a system of nonlinear equations governing the nonequilibrium evaporation is obtained. The system retains main physical effects which take place in the system. A linear stability analysis is also carried out. Both monotonic instability mode and oscillatory one are found and analyzed. The analysis does not include the Born repulsion force in intermolecular interactions.

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Date submitted: 13 Jul 2014

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