

Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

High-frequency vibration of heated liquid layer covered by insoluble surfactant¹ ALEXANDER MIKISHEV, Sam Houston State University, ALEXANDER NEPOMNYASHCHY, Technion — We study the influence of high-frequency vertical vibration on thin liquid layer with insoluble surfactant adsorbed on the free surface. The layer is subjected to a vertical temperature gradient (the layer is heated either from below or from above). We perform the linear analysis of Marangoni instability. The system is characterized by monotonic and oscillatory modes. The characteristic frequency of long surfactant-induced Marangoni waves is $O(\varepsilon^2)$, where ε is the scale of wavenumber, hence the frequency of external vibrations of order one can be considered as a high frequency. The threshold of the onset of Marangoni convection is shifted by the vibration. Applying a long-wave approach we obtain a system of weakly nonlinear equations describing dynamics near the threshold. The standard Floquet method helps to investigate the excitation of short scale Marangoni waves.

¹ERAU 13373

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Date submitted: 29 Jul 2016

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