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A novel mechanism of Marangoni motion based on liquid-liquid phase transition VIATCHESLAV BEREJNOV, Cornell University — Marangoni motion is caused by inhomogeneity of the temperature and concentration fields along the liquid interfaces. In the case of a drop immersed in another liquid, the interface produces a momentum that propels the drop. Most existing models assume the surface tension to be a linear function of temperature and concentration. However the universality of the linear approximation should be reconsidered. We propose a new view on the drop locomotion where the local inhomogeneity of surface tension plays a central role. We observed fast self-running oil "lenses" on the air/water interface. Measured velocities of these drops were two orders of magnitude higher than the corresponding velocities in the linear model. It was found that our water/oil system continuously evolves during its equilibration and eventually reaches the spinodal decomposition. The liquid-liquid transition across the interface randomly creates areas of spontaneous emulsification (very low surface tension). Competition between the low and high surface tension areas results on the average in highly nonlinear surface tension gradients that enormously propel the drop.

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