Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Buoyancy and capillary effects in the equilibrium solutions of liquid lens[1] PABLO RAVAZZOLI, JAVIER DIEZ, ALEJANDRO GONZLEZ, Instituto de Fsica Arroyo Seco, Universidad Nacional del Centro de la Provincia de Buenos Aires, and CIFICEN-CONICET-CICPBA, HOWARD STONE, Department of Mechanical and Aerospace Engineering, Princeton University, Princeton, NJ 08544 USA — We study the equilibrium shape of a liquid drop resting on top of a liquid surface, i.e., a floating lens. We consider the surface tension forces in non–wetting situations (negative spreading factor), as well as the effects of gravity. We obtain analytical expressions for the drop shape when gravity can be neglected. Perhaps surprisingly, when including gravity in the analysis, we find two different families of equilibrium solutions for the same set of physical parameters. These equilibrium solutions differ in the curvature sign of the external liquid surface. By means of energetic considerations, we determine the family of solutions that has the smallest energy, and therefore, the most likely to be found in nature. We compare the shape of those solutions with preliminary experiments.

[1]PDR, AGG and JAD acknowledge support from Consejo Nacional de Investigaciones Cientficas y Tcnicas (CONICET, Argentina) and Agencia Nacional de Promocin Cientfica y Tecnolgica (ANPCyT, Argentina) with grant PICT 1067/2016. HAS research was partially supported by NSF through the Princeton Universitys Materials Research Science and Engineering Center DMR- 1420541.

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Date submitted: 31 Jul 2020 Electronic form version 1.4