Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Circular hydraulic jumps due to surface tension[1] RATUL DASGUPTA, YASHIKA DHOTE, PARTHA SARATHI GOSWAMI, Indian Inst of Tech-Bombay, RAMA GOVINDARAJAN, ICTS - TIFR Bangalore — We report **the first computations to our knowledge** of circular hydraulic jumps created purely due to surface tension at small length scales. The existence of such jumps was shown more than a decade ago in *M. Mathur et. al. Phys. Rev. Lett., 98(16), 2005*. Using the open-source code basilisk (basilisk.fr), we obtain such hydraulic jumps from Direct Numerical Simulations of the axisymmetric Navier-Stokes equations with surface tension of near air-water values, with and without gravity. In our simulation, a hydraulic jump forms from an impinging jet of water of radius $\mathcal{O}(\infty)$ microns. This causes a jump at a steady-state radius of ≈ 9 microns. At these small scales where surface tension is expected to dominate over gravity, we find that the location of the jump is nearly insensitive to the presence or absence of gravity in the simulations. However, we also observe that even at these small scales, the film thickness downstream of the jump and the shape of the jump itself are influenced by gravity quite severely. Notably, the existence of the jump itself does not require gravity. Comparison with theory will be presented at the conference.

[1]We thank Dept. Science and Technology DST-SERB grant EMR/2016/000830 for computational support

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Date submitted: 10 Aug 2020 Electronic form version 1.4