Abstract Submitted
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Polygonal instabilities MATTHIEU LABOUSSE, University Paris Diderot — The interaction of a vortex with a free surface is encountered in a series of experiments, the hydraulic jump [1], the hydraulic bump [2], the toroidal Leidenfrost experiment [3]. All these experiments share in common an unstable configuration in which azimuthal perturbations give rise to polygonal patterns. We propose a unified theoretical framework to model the emergence of this instability by investigating the stability of a liquid torus with a poloidal motion [4]. As simple as it is, we show that the model retains the necessary ingredients to account for the experimental observations. In this talk, I will first describe the model and compare it to the existing data. However this model is purely inviscid and reaches its limits when being applied to relatively moderate Reynolds flows. So in a second part, I will present a recent experimental and theoretical investigation in which polygonal patterns are now driven by Marangoni flows [5]. To our great surprise, it extends the range of validity of the initial proposed framework, much more than initially expected.

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[5] M. Roché, Z. Li, I.M. Griffiths, S. Le Roux, I. Cantat, A. Saint-Jalmes, H. A. Stone, *Phys. Rev. Lett.* (2014)

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