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Deformation and transport of an elastic fiber in a cellular flow ELIE WANDERSMAN, OLIVIA DU ROURE, ESPCI, ANKE LINDNER, MARC FERMIGIER, ESPCI — Flexible fibers can undergo a buckling instability when they are in interaction with a viscous flow. It has been predicted numerically that the deformation of an elastic fiber can affect both the macroscopic rheology and the transport of the individual fiber through a cellular flow [1]. However, direct experimental observations of the coupling between fiber conformation and flow behavior are still missing. We study experimentally the deformation and the transport of an individual elastic fiber (Length $L \sim 1$ cm, radius $r \sim 100\mu$m, Young's modulus $Y \sim 0.1$ MPa) in a cellular flow formed by a lattice of hyperbolic stagnation points. In the vicinity of a stagnation point, the fiber buckles if the viscous forces acting on the fiber overcome the elastic forces. We focus on:

- the onset of the buckling instability of the fiber, varying the elastic properties of the fiber, the shear rate and the ratio fiber length to the cell size.
- The dynamical properties of the fiber, and more precisely, the modification of the transport of the fiber in the lattice due to its deformation in the flow.

[1] Young et. al. *Phys. Rev. Lett.* **99** 058303 (2007)

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