Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Buckling probability of an elastic fiber transported in a viscous flow of counter-rotating vortices NAWAL QUENNOUZ, PMMH, YUAN N. YOUNG, New Jersey Institute of Technology, MICHAEL SHELLEY, The Courant Institute, ANKE LINDNER, OLIVIA DU ROURE, PMMH — The interaction of a deformable body with a viscous flow is found in a wide range of situations ranking from biology to polymer science. Here we address the question how an elastic object transported in a viscous flow is deformed by the latter. We experimentally study the deformation and the transport of an isolated elastic fiber in a viscous cellular flow, namely a lattice of counter-rotating vortices, at low Reynolds. We have shown [1] that the fiber can buckle when approaching a stagnation point in this type of flow. The buckling threshold is determined by the relative intensity of viscous and elastic forces, the elasto- viscous number Sp. We observe that even above the threshold the fiber does not buckle each time it passes a stagnation point. We characterize the probability to buckle as a function of the Sp number for a large range of parameters (varying the flow properties, the elastic modulus, aspect ratio of the fiber and length of the fiber compared to the size of the lattice independently). We compare our experimental results to numerical simulations [2] and we discuss the origins of the differences observed. [1] E. Wandersman, N. Quennouz, Fermigier, A. Lindner and O. du Roure. *Buckled in translation*, Soft Matter 6, 57155719, 2010. [2] Y.-N. Young and M. Shelley. *Stretch-Coil Transition and Transport of Fibers in Cellular Flows*, PRL 99, 058303, 2007.

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Date submitted: 15 Aug 2011 Electronic form version 1.4