

Abstract Submitted  
for the DFD09 Meeting of  
The American Physical Society

**Droplet deformation in a channel: viscoelastic effects**<sup>1</sup> ARTHUR PERCHERON, ESPCI, Paris, ROUSHAN ALAM, GITA SEEVARATNAM, JERRY HENG, OMAR MATAR, Imperial College London — In this work, the influence of viscoelasticity on the deformation of a sessile droplet subjected to a pressure-driven flow in a channel is investigated experimentally. The droplet’s response is examined using flow visualisation as a function of initial droplet volume, flow rate and elasticity. The results of our experiments are used to identify various flow regimes. These include low flow rate regimes wherein the droplets optimise their shapes in response to the flow before reaching a steady state. With increasing flow rate, droplets exhibit “sliding”, “crawling”, and detachment regimes. In the latter case, and due to large elastic contributions, droplets develop very long necks, which pinch off and recoil to join the remnants of the mother droplet. By plotting a “flow map” in the space of the Ohnesorge and Deborah numbers, transitions between each regime of deformation are identified.

<sup>1</sup>EPSRC Grant number EP/E046029/1

Omar Matar  
Imperial College London

Date submitted: 23 Jul 2009

Electronic form version 1.4