Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Scaling transitions during the thinning of viscous dripping droplets[1] ALFONSO A. CASTREJON-PITA, University of Cambridge, University of Oxford, J. RAFAEL CASTREJON-PITA, University of Cambridge, SUMEET S. THETE, Purdue University, KRISHNARAJ SAMBATH, Chevron Corporation, E. JOHN HINCH, IAN M. HUTCHINGS, JOHN R. LISTER, University of Cambridge, OSMAN A. BASARAN, Purdue University — The dynamics of filament thinning during the formation of viscous Newtonian drops is studied experimentally and numerically. High speed shadowgraph imaging and sub-pixelar image analysis are used to extract the minimum neck diameter in terms of the time τ to breakup. Aqueous solutions of glycerol with viscosities ranging from 20 to 360 mPa s are used as the working fluids. In addition, nozzles of different diameters were used to vary the initial dynamic conditions. High resolution numerical simulations were performed to extract the instantaneous Reynolds number to understand the transition between different scaling regimes (presented in detail in a complementary presentation). Our results seem to suggest that, under some conditions, the transition from Potential Flow (PF) to an inertial-viscous (IV) regime is intertwined by a viscous regime (V).

[1]This work was supported by the EPSRC (Grant EP/G029458/1), the KACST-Cambridge Centre and the Royal Society.

Alfonso A. Castrejon-Pita
University of Cambridge, University of Oxford

Date submitted: 02 Aug 2013 Electronic form version 1.4