Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Scaling the drop size in coflow experiments ELENA CASTRO-HERNANDEZ, Area de mecanica de fluidos, Universidad de Sevilla, VENKATA GUNDABALA, ALBERTO FERNÁNDEZ-NIEVES, School of Physics, Georgia Institute of Technology, JOSE MANUEL GORDILLO, Area de mecanica de fluidos, Universidad de Sevilla, AREA DE MECANICA DE FLUIDOS, UNIVERSIDAD DE SEVILLA TEAM, SCHOOL OF PHYSICS, GEORGIA INSTITUTE OF TECHNOLOGY TEAM — We performed extensive experiments with coflowing fluids in microfluidic devices. When the inner fluid is a liquid, two different types of regimes have been identified, dripping and jetting. Dripping is characterized by the fact that no long jets of the dispersed phase are formed. By contrast, when jetting occurs, the dispersed phase forms long liquid jets and drops are emitted right at the tip of the liquid thread. In the jetting regime, we could reproduce the *widening* and *stretching* regimes [Utada et. al. PRL 99 (2007)]. We have given a step further and provide a general expression to estimate the drop size in either regime as a function of measurable parameters. By contrast to the liquid case, when the inner liquid is a gas, we find that no long jets form, irrespective of the values of the control parameters, [Marin et. al. Coll. Surf. A (2009)].The crucial role of the axial strain exerted by the outer stream on the inner one to stabilize long fluid threads will be elucidated by means of BEM simulations, which show good agreement with experiments.

Elena Castro-Hernandez
Area de mecanica de fluidos, Universidad de Sevilla

Date submitted: 29 Jul 2009 Electronic form version 1.4