DFD08-2008-000178
C

Abstract for an Invited Paper
for the DFD08 Meeting of
the American Physical Society

Tip-Streaming in simple viscous co-flows

ALVARO G. MARIN, JOSE M. GORDILLO, U Sevilla

The formation of hydrodynamic structures able to yield micron-sized drops -smaller than 1.5 microns- through a simple coflowing device (R. Suryo and O. A. Basaran, *PoF* **18**, 082102, 2006) will be experimentally demostrated. The so-called tip-streaming structures appearing when a deformed drop emits fine jets from its tip, have been occasionally found with the aid of surfactants and with electrohydrodynamic-driven flows. Here, we report tip-streaming by simply making two liquid streams co-flow coaxially under creeping flow conditions, avoiding the use of either surfactants or electric fields. In our experimental parametric range, liquid micrometric jets are generated with diameters over two orders of magnitude smaller than the diameter of the capillary from which the inner stream is injected. Moreover, a system consisting of multiple injectors has been constructed and tested with optimal results: the tip streaming regime is perfectly reproduced for all the injectors, which are arranged in an hexagonal pattern. In the case when the inner fluid is a gas instead of a liquid we find that, up to our optical resolution, conical tips are visualized if no gas is injected. For small values of the gas flow rate, and no matter how large the outer capillary number is, no stable long gas jets are formed. Instead, we observe the periodic formation of bubbles from an unsteady conical tip. In collaboration with Jose M. Gordillo, Universidad de Sevilla.