Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Ligament breakup without surface tension LIONEL VINCENT, LAURENT DUCHEMIN, STÉPHANE LE DIZÈS, EMMANUEL VILLERMAUX, Aix Marseille Université, IRPHE, Marseille, France — We study the breakup of an axisymmetric low viscosity liquid volume (ethanol and water), held by surface tension on supporting rods, when subject to a violent axial stretching. One of the rods is promptly set into a fast motion, either with constant acceleration, or constant velocity. In both cases, a thin ligament is withdrawn from the initial liquid volume, which eventually breaks-up at time t_b, leaving a liquid mass m attached to the moving rod. We find that the breakup time and entrained mass are related by $t_b \sim \sqrt{m/\sigma}$, where σ is the liquid surface tension. For a constant acceleration γ, and although the overall process is driven by surface tension, t_b is surprisingly found to be independent of σ, while m is inversely proportional to γ. The case with constant velocity will be considered too.

Emmanuel Villermaux
Aix Marseille Université, IRPHE, Marseille, France

Date submitted: 26 Jul 2013 Electronic form version 1.4