Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Crumpled liquid sheet HENRI LHUISSIER, EMMANUEL VILLERMAUX, Aix-Marseille Universite, IRPHE — When a liquid jet of density ρ impacts a solid disk at right angle, it expands radially into a thin sheet with velocity u and thickness h. The sheet possibly bends under the action of surface tension σ to form a stationary closed bell. For particular impacting conditions and pressure in the enclosure, spectacular stable shapes exhibiting *sharp edges*, sudden inflections and *liquid points* are observed. Those sharp wrinkles develop when the ratio $We = \rho u^2 h/\sigma$ of the flow inertia to capillary confinement approaches a critical value $We_c = 2$. There, the local curvature of the sheet in the direction of the flow κ diverges. However, accounting for finite thickness effects (i.e. $\kappa h = \mathcal{O}(1)$), we show that two coexisting solutions for κ emerge, explaining the sudden inflection of the sheet, as if it were crumpled. The development of regularly spaced *liquid points* that form along the crumpled *edge*, breaking the initial axial symmetry is a consequence of the centripetal acceleration κu^2 the liquid suffers as it flows past the edge. The resulting inertial destabilization induces thickness modulations with drapes like shapes on the sheet, forming an alternation of subcritical ($We < We_c$) and supercritical ($We > We_c$) regions downstream.

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Date submitted: 29 Jul 2010 Electronic form version 1.4