

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

“Effervescent” Atomization in two dimensions HENRI LHUISSIER,
EMMANUEL VILLERMAUX, IRPHE, Aix Marseille Universite — A planar *Savart*
water sheet uniformly seeded with small air bubbles in large surface concentration
is studied as a model experiment of the so-called “effervescent” atomization process.
This two-dimensional setup allows for a quantitative observation of all the steps
of the sheet disintegration into a collection of disjointed droplets. The bubbles are
heterogeneous nucleation sites which puncture the sheet forming growing holes. The
dynamics of the holes opening competes with the simultaneous nucleation rate of new
holes in a statistically stationary fashion. The liquid constitutive of the sheet is then
transitorily concentrated into a web of ligaments of various lengths and diameters,
at the junction between adjacent holes. Their break-up produces the final spray.
We provide a complete description of the ligaments web statistics in the case where
nucleation is synchronous, and show that the drop size dispersion from the breakup
of a single ligament is responsible for the shape of the resulting overall spray drop
size distribution.

Emmanuel Villermaux
Aix Marseille Universite

Date submitted: 28 Jul 2011

Electronic form version 1.4