Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Self-similar breakup of a retracting liquid cone FREDERIK BRASZ, ALEXIS BERNY, JAMES BIRD, Boston University — When a fluid filament breaks up due to the Rayleigh-Plateau instability, a thin thread typically pinches off from a nearly spherical drop. Depending on its shape, this thread can break up again while it retracts to form satellite and even sub-satellite droplets. Past studies have modeled the shape of the retracting filament as a cone, yet the dynamics of nearly inviscid retracting cones are known to be stable, preventing any further filament breakup. Here we show that under certain finite perturbations, retracting conical liquid filaments can become unstable and break up into a cascade of self-similar droplets. Combining numerical simulations and experiments, we explore whether or not a conical filament is likely to break up based on cone angle and initial perturbation. We expect our results to be relevant in applications in which satellite bubbles or droplets are important, such as in modeling the flux of aerosols from the ocean to the atmosphere.

Frederik Brasz
Boston University

Date submitted: 01 Aug 2016 Electronic form version 1.4