Abstract Submitted
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Classification of secondary atomization mechanisms NICOLAS RIMBERT, Universite de Nancy — In the 20th century both drop towers and shock tubes have been used to study the breakup of an accelerated drop in an air strream. This led Faeth and colleagues to synthesize the different breakup modes observed in a chart involving the Weber *We* and the Ohnesorge *Oh* number of the droplet (*We* is the ratio between kinetic energy and surface energy of the droplet whereas *Oh* governs the damping rate of its surface oscillations). The most important drop breakup mechanisms are for increasing values of *We*: the bag breakup, the shear breakup and the so-called catastrophic breakup. Rayleigh-Taylor instability (RTI) is one of the main explanations and it has recently elucidated some experimental results with success, first thanks to accurate measures of the drop acceleration and then by estimating it through use of drag coefficients. The point is that the droplet firstly deforms into a spheroid which increases its drag coefficient and eventually accelerates the growth of RTI. Unlike most linearized theory, The Droplet Deformation and Breakup (DDB) model makes use of a variational technique to obtain the non linear evolution equation of the semi-axis of the spheroid. It will be shown how to combine both the DDB theory and either the classical RTI or a viscous extension. We will firstly show how the different domain can be theoretically derived. Then the classical hypothesis that the deformation mechanism is much quicker than the growth of the RTI will be proved invalid for high *We*.

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