Abstract Submitted
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Thermal fluctuations and the breakup length of Savart capillary jets[1] F. JAVIER GARCÍA, Universidad de Sevilla, Spain — How long can a capillary jet be before it breaks up into droplets? Much time after the pioneering experimental work of Savart[2] on the breakup of liquid jets isolated from external acoustic noise, no analytical prediction for their length has been derived yet. Even the precise nature of the perturbations leading to the natural breakup of a capillary jet remains a mystery. Only empirically fitted estimates have been proposed up to now, assuming an exponential growth of an unknown initial amplitude of those perturbations. Here, the evolution of a liquid jet emerging from a thin-wall orifice and subjected to thermal-noise fluctuations is explored through a stochastic linear modal analysis. Contrary to what has been assumed before, it is proven that the average amplitude of noisy perturbations does not grow exponentially. For the first time, a simple analytical estimate of the natural breakup length of a liquid jet is derived without the aid of any adjusting parameter. The breakup length of Savart liquid jets exiting through 3mm-diameter orifices are well predicted by this formula. The parametric range of application of this analysis and its accuracy are discussed.

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[2]F. Savart, *Annal. Chim.* **53**, 337 (1833), plates in Vol. 54.

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