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Atomization of an Undulating Liquid Sheet

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This paper presents an experimental study devoted to the understanding of break-up mechanisms of liquid sheets. The studied sheet is formed by the normal collision of a round jet on a solid rod which can oscillates vertically. The liquid expands radially in air initially at rest. A shear instability develops at the interface liquid/gas resulting in an undulated motion of the liquid sheet. Because of the velocity contrast between the liquid and the surface waves, the liquid is submitted to transient accelerations as it moves through the undulations. This situation trigs a Rayleigh–Taylor instability leading to azimuthal thickness modulations. The thickness profile governs the free rim shape and therefore the drops formation. A model including the development of both instabilities allows us to predict the sheet and drops sizes.

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