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Free radially expanding liquid sheet in air: time- and space-resolved measurement of the thickness field[1] CHRISTIAN LIGOURE, CLARA VERNAY, LAURENCE RAMOS, Laboratoire Charles Coulomb, UMR no5221 CNRS & University Montpellier 2 — The collision of a liquid drop against a small target results in the formation of a thin liquid sheet that extends radially until it reaches a maximum diameter. We have developed an original time- and space-resolved technique to measure the thickness field of this class of liquid sheet, based on the grey level measurement of the image of a dyed liquid sheet recorded using a fast camera. This method enables a precise measurement of the thickness in the range $(10 - 450)$ μm, with a temporal resolution equals to that of the camera. Two asymptotic regimes for the expansion of the sheet are evidenced. The scalings of the thickness with t and r measured in the two regimes are those that were predicted but never experimentally measured before. Interestingly, our experimental data also evidence the existence of a maximum of the film thickness $h_{\max}(r)$ at a radial position $r_{\mathrm{h_{max}}}(t)$ corresponding to the crossover of these two asymptotic regimes. The maximum moves with a constant velocity of the order of the impact velocity, Hence, our data has allowed one to reconcile the two apparently inconsistent theoretical predictions found in the literature Thanks to our visualization technique, we also evidence an azimuthal thickness modulation.

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