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Particle image velocimetry inside emanating jets to study jet shape and evolution CEES VAN RIJN, DANIEL BONN, University of Amsterdam, BODJIE VAN BRUMMEN, JERRY WESTERWEEL, Technical University Delft, FLUID MECHANICS GROUP TUD COLLABORATION[1], SOFT MATTER GROUP UVA COLLABORATION[2] — Jets resulting from drop impact on a fluid are a fascinating and remarkably robust phenomenon. However, their beautiful shapes remain incompletely understood. We perform PIV experiments to probe dynamic fluid motion inside an emanating jet to relate the fluid flow to the jet evolution and shape. Several theories exist relating jet shape and internal fluid motion, but none so far can describe all the different features of the jet. We find that for some experimental parameters that the jet acquires a large upward velocity in a small upward acceleration region located near the jet base due to collapse of a cavity formed during impact of the falling drop. The PIV allows to distinguish three jet regions: a small acceleration region, a long ballistic region where fluid moves with a nearly constant momentum, and a jet tip region where drop formation happens. In most views on jet shape and formation the role of surface tension is neglected; our experiments however demonstrate that both the ballistic and tip region of the jet are strongly decelerated by surface tension forces, that also affect the jet shape.

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