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Simultaneous measurement of the geometry and the internal 3D velocity field of a micron sized droplet confined in a channel using Astigmatism-PTV TOBIAS MACK, CHRISTIAN CIERPKA, CHRISTIAN J. KÄHLER, Bundeswehr University Munich — Astigmatism-PTV is a method that allows to measure with a single camera the fully three-dimensional, three-component velocity field. The technique is ideally suited for microfluidic velocity measurements without errors due to in-plane and out-of-plane averaging (Cierpka et al. Meas Scie Tech 21, 2010). Recently it was shown, that the interface between two fluids or the surrounding fluid and droplets or bubbles can be estimated as well with the technique (Rossi et al., Meas Scie Tech 22, 2010). In this contribution the advantages of both techniques are combined to measure the shape of a droplet inside a micro channel along with the internal 3D flow field of the droplet induced by the surrounding fluid. For the current investigation, particles were only distributed within oil-droplets. Therefore the shape of the droplet could be later reconstructed by the volumetric particle positions and the velocity can be estimated tracking the same particles in consecutive frames of the same dataset. The procedure allows the simultaneous determination of the shape and the droplet velocity as well as the inner flow field and offers a great potential for current research.

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