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**Three-dimensional tracking of acoustophoretic particle trajectories in a Poiseuille flow**[1] RUNE BARNKOB, MASSIMILIANO ROSSI, ALVARO G. MARIN, CHRISTIAN J. KÄHLER, Bundeswehr University Munich — Acoustics in microfluidics has proved as an excellent technique for particle separation. The technique is often based on advecting the particles by a Poiseuille flow, while acoustic forces push the particles transversely across the flow according to particle size, density, and compressibility. In this work we study such particle trajectories in a microchannel containing a dilute particle suspension. The microchannel is excited in its transverse ultrasound half-wave resonance, while a Poiseuille flow is imposed along the channel. In addition to the viscous drag force from the imposed flow, the particles are subject to forces from acoustic radiation as well as viscous drag from acoustic streaming (Muller et al., PRE, in press, 2013). In the microchannel cross-section, the acoustic streaming is two-dimensional, while the acoustic radiation force is one-dimensional. However, the actual particle velocity induced by the acoustic radiation force has a two-dimensional character due to wall-enhancement of the viscous Stokes drag. In the experiments, we use a 3D astigmatic particle tracking technique (APTV, Cierpka et al., Meas Sci Technol 22, 2011) to determine the particle trajectories, which we compare to theoretical predictions for future optimization of acoustic separation systems.

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