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Experimental analysis of radiation- and streaming-induced microparticle acoustophoresis MASSIMILIANO ROSSI, ALVARO MARIN, CHRISTIAN J. KÄHLER, Bundeswehr University Munich, PER AUGUSTSSON, THOMAS LAURELL, Lund University, PETER B. MULLER, RUNE BARNKOB, HENRIK BRUUS, Technical University of Denmark — We present an experimental analysis of the acoustophoretic motion of microparticles suspended in a liquid-filled acoustofluidic microchannel. This analysis intends to provide an experimental validation and support to very recent numerical and analytical models of radiation- and streaming-induced microparticle acoustophoresis (see Muller et al., Lab Chip 12, in press, 2012). For the experiments, we used a suspension of water and spherical polystyrene particles in a straight microchannel with rectangular cross section, actuated in its 1.94-MHz resonance by means of a piezoelectric transducer. The particles were labeled with a fluorescent dye and their motion was observed using an epifluorescent microscope. For the analysis, the Astigmatism Particle Tracking Velocimetry (APTV) technique was used to measure the three-dimensional trajectories and velocities of the particles with high precision and resolution (Cierpka et al., Meas Sci Technol 22, 2011). The experiments were performed for different particle sizes, ranging from 0.5-μm particles, dominated by the Stokes drag force induced by the acoustic streaming of the flow, to 5-μm particles, dominated by the acoustic radiation force. The results agree well with the analytical and numerical predictions.

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