Abstract Submitted
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Numerical analysis of radiation- and streaming-induced microparticle acoustophoresis[1] RUNE BARNKOB, PETER BARKHOLT MULLER, HENRIK BRUUS, Technical University of Denmark, MADS JAKOB HERRING JENSEN, COMSOL A/S — We present a numerical analysis of the acoustophoretic motion of microparticles suspended in a liquid-filled microchannel excited with an ultrasound field tuned to resonance. The imposed first-order ultrasound field generates second-order fields leading to two particle forces with a non-zero time-average: the acoustic radiation force from sound-wave scattering off the particles and the Stokes drag force from the induced acoustic streaming flow. We consider a viscous heat-conducting liquid and non-interacting spherical particles. The model is based on the thermoviscous acoustic equations and takes into account the micrometer-thin but crucial viscous boundary layers at rigid walls. Using a numerical tracking scheme, we quantify the acoustophoretic particle velocities for experimentally relevant parameters. We characterize the transition from radiation- to streaming-dominated acoustophoretic motion as function of particle size, channel geometry, and material properties. See also Muller *et al.*, Lab Chip **12**, in press (2012).

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