ESI: On the acoustically induced fluid flow in particle separation systems employing standing surface acoustic waves - Part II

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Movie M1: Experimental results of the acoustically induced fluid flow at the beginning of the sSAW (ROI 1) for a channel height of 185 µm, a SAW wavelength of 20 µm and an electrical power of 154 mW visualized by streamlines in the temporally and spatially averaged velocity fields in a 3D view. The beginning of the IDT is indicated by a red dashed line.

Movie M2: Streamlines in the temporally and spatially averaged velocity fields at the end of the sSAW at a channel height of 185 µm, a SAW wavelength of 20 µm, and an electrical power of 154 mW. The end of the IDT is highlighted by a red dashed line.

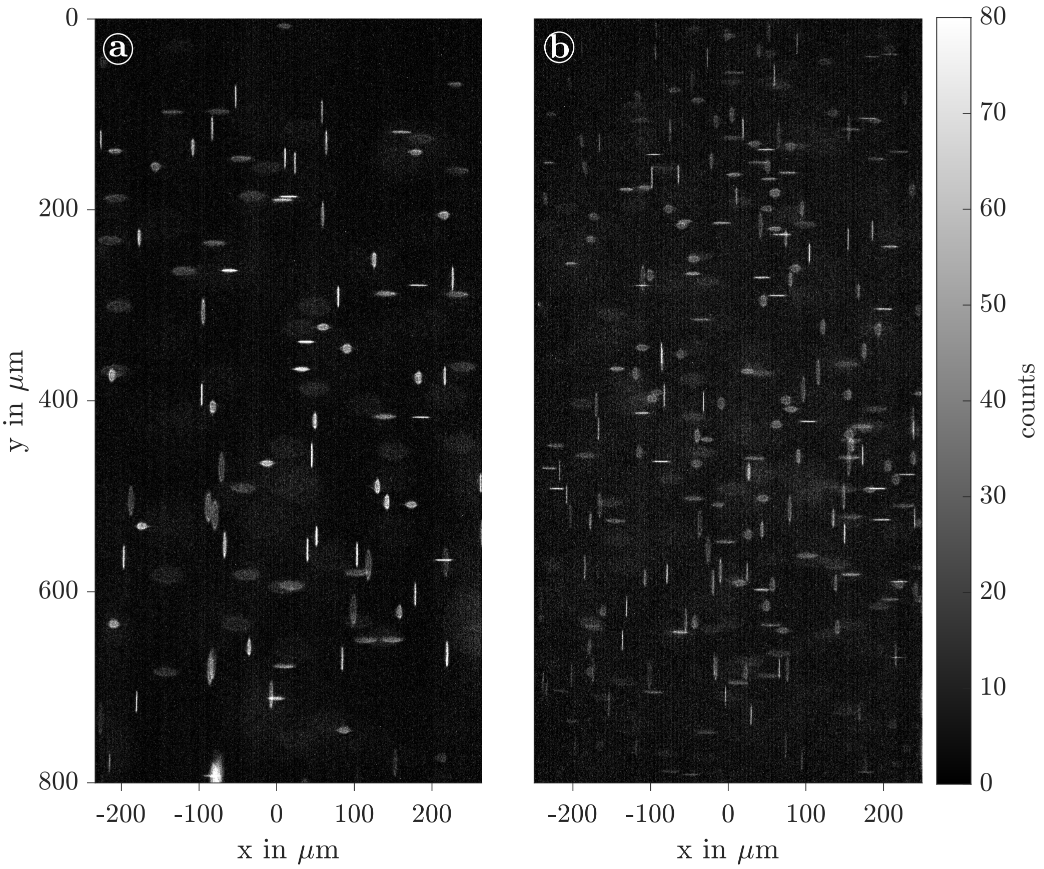

FIG. S1. Experimentally acquired images using astigmatism particle tracking velocimetry (APTV) at the beginning (ROI 1) of the pseudo-standing surface acoustic wave (sSAW) for a wavelength of 150 µm and a channel height of 185 µm. Spherical polystyrene particles with radii of 0.57 µm (a) and 0.225 µm (b) were used with a seeding density below 5.1×10^{-6} % v/v and 1.0×10^{-6} % v/v , respectively. Overall, the seeding density remained low to allow for the detection of particle positions and shapes as well as to reduce particle-particle interactions. When reducing the particle radius to 0.225 µm, the signal-to-noise ratio further decreased.

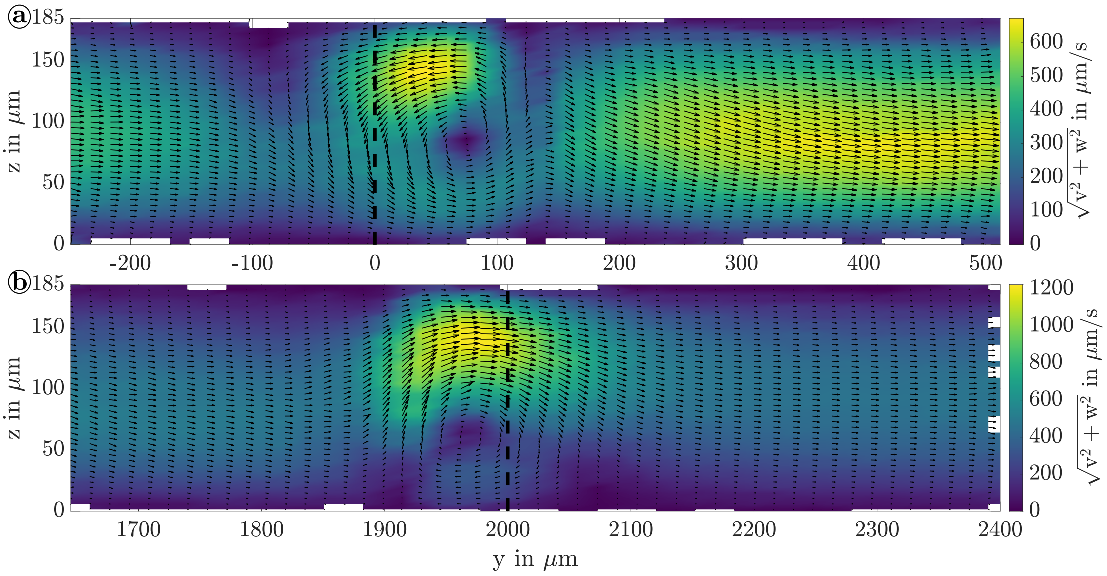

FIG. S2. Experimentally determined fluid flow in sectional planes at the beginning (a, $x_0 = 0\,\mu m$) and end (b, $x_0 = 130\,\mu m$) of the standing surface acoustic wave (sSAW) with a wavelength of $20\,\mu m$, a channel height of $185\,\mu m$, and an electric power of 154 mW. The color scale denotes the absolute in-plane velocity in the plane shown. The dashed lines indicate the beginning and the end of the IDTs.

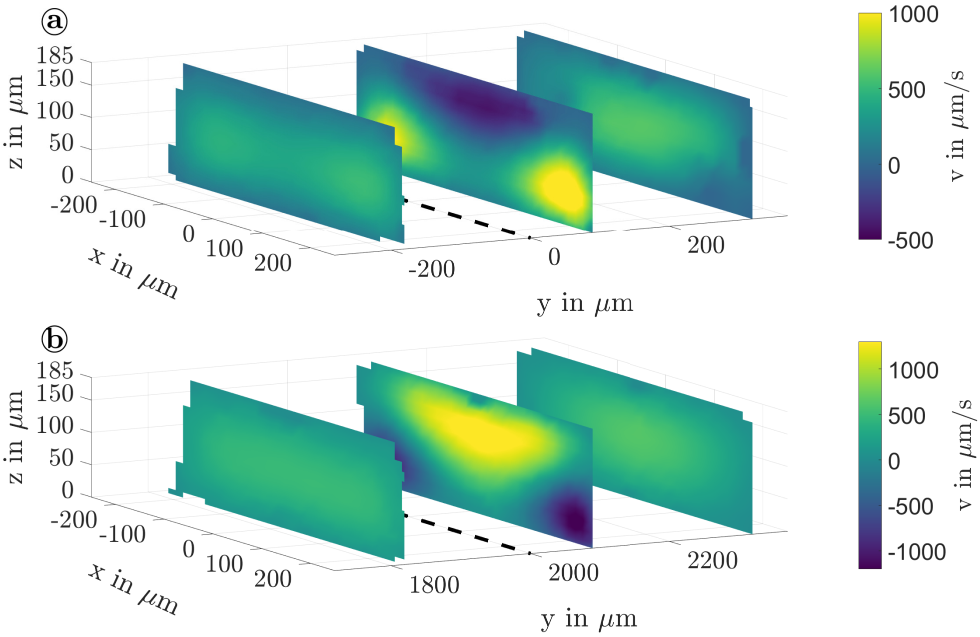

FIG. S3. Velocity component $v(x, y_i, z)$ in main flow direction in sectional planes around the beginning (a) and the end of the sSAW (b) for a wavelength of $20\,\mu m$, a channel height of $185\,\mu m$ and an electrical power of 154 mW. Recirculations and separated velocity maxima occur only near the edges of the IDT at $y = 0\,\mu m$ and $y = 2000\,\mu m$ (highlighted by dashed lines).

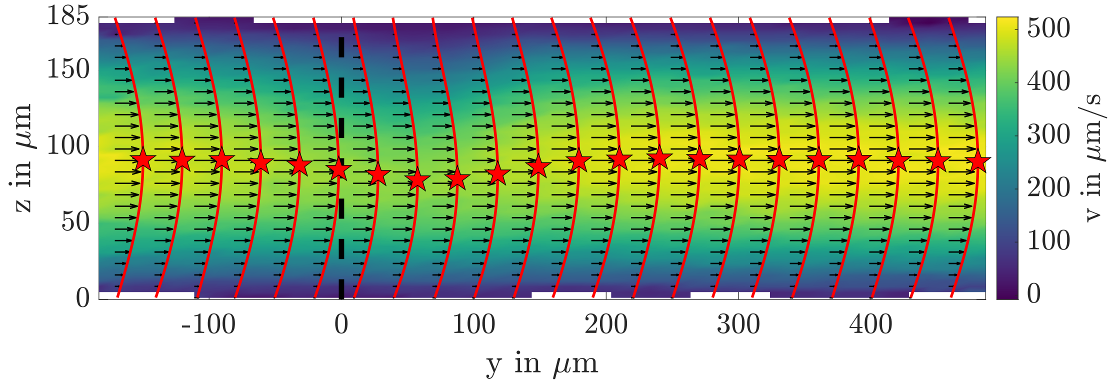

FIG. S4. Vector field $(0, v, 0)'$ with velocity component $v(x_0, y, z)$ in main flow direction along the channel center ($x_0 = 0\,\mu$m) for a SAW wavelength of 20 µm, a channel height of 185 µm and an electrical power of 29.85 mW. The velocity profiles $v(x_0, y_\mathrm{i}, z)$ at the location (x_0, y_i) are approximated by fourth order polynomials (red curves). The positions of maximum velocity are denoted by red stars.