Electronic Supplementary Information (ESI) for Lab on a Chip

Investigation of acoustic streaming patterns around oscillating sharp edges

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I. First Order Fields:

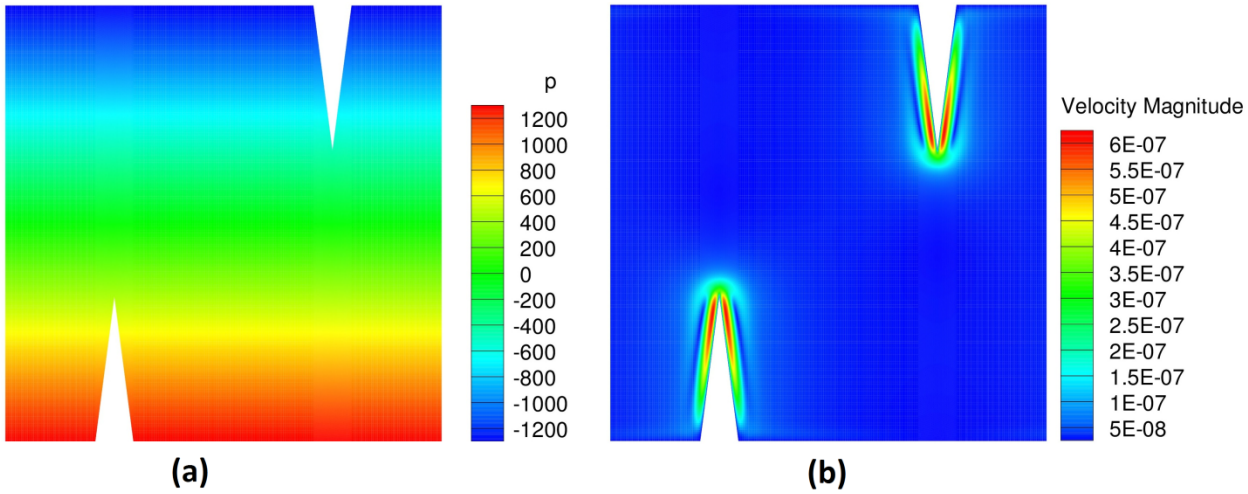

Fig.1: (a) Plot of the first-order pressure field (b) Plot of the first-order velocity field. The channel dimensions L = 300 µm, H = 600 µm, $\alpha = 15^0$, and h = 200 µm. The wall displacement was only in the y direction with magnitude 1 µm. The plots shown are for a particular time instant since the first-order fields are time-harmonic in nature.

II. First Order Fields:

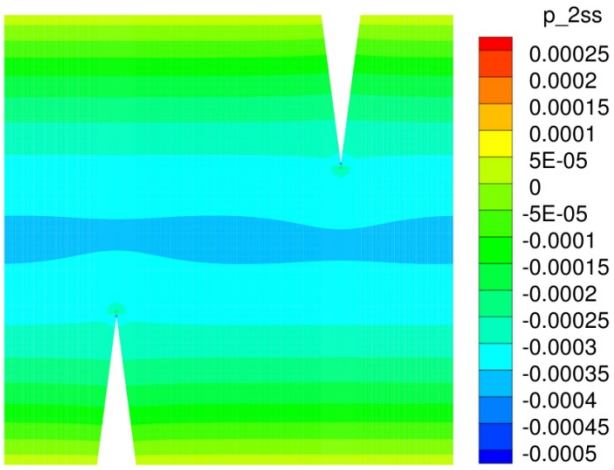

Fig.2: (a) Plot of the second-order pressure field. The channel dimensions L = 300 µm, H = 600 µm, α = 15^0, and h = 200 µm. The wall displacement was only in the y direction with magnitude 1 µm.

III. Comparison of Lagrangian velocity for different frequencies:

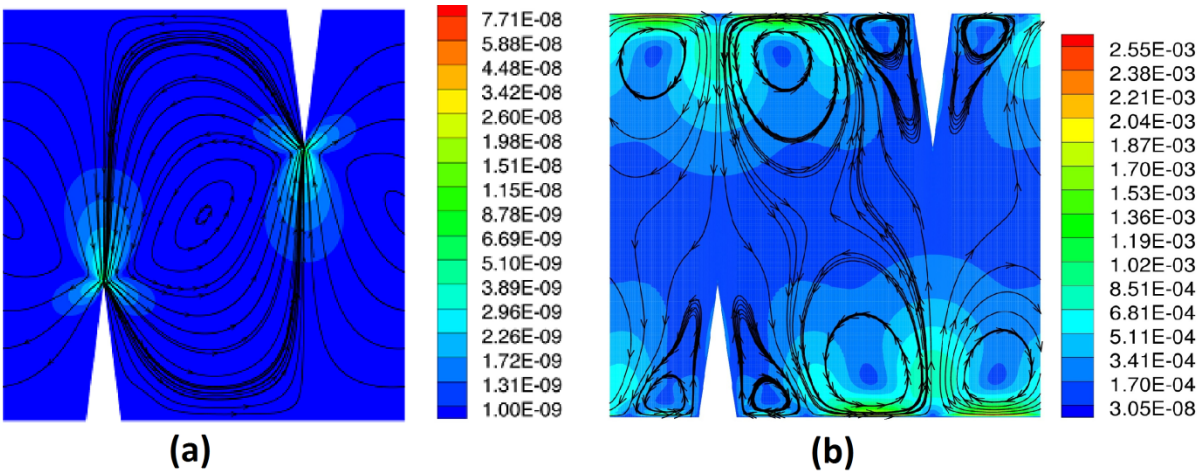

Fig.3: Plot of the mean Lagrangian velocity, $\mathbf{v}^L$, for (a) 4.75kHz, (b) 4.75 MHz. The channel dimensions L = 300 µm, H = 600 µm, α = 15^0, and h = 200 µm. The wall displacement was only in the y direction with magnitude 1 µm in case (a) and I nm in case (b). The wall displacement amplitude was reduced by a factor of 1000 in case (b) so that the channel walls are subject to same velocity in both the cases.

IV. Effect of Power:

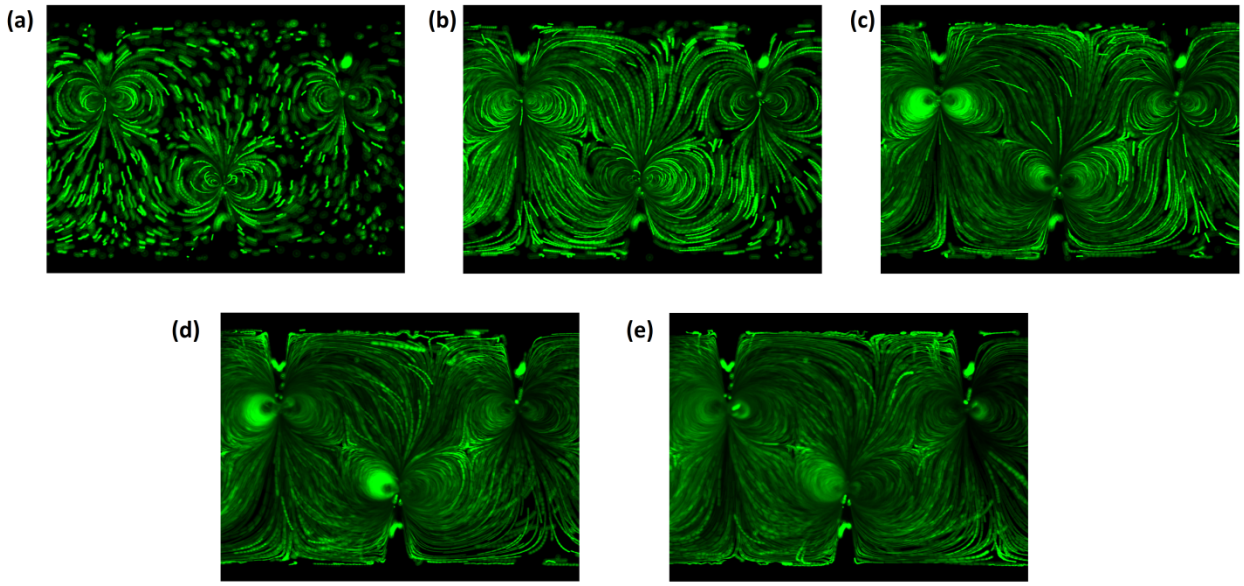

Fig. 4: Experimentally observed trajectories of 1.9 µm diameter fluorescent polystyrene beads in our acoustically oscillated micro-mixer with sharp edges for different power, (a) 10 V_{p-p}, (b) 20 V_{p-p}, (c) 30 V_{p-p}, (d) 40 V_{p-p}, (e) 50 V_{p-p} The geometry of the micro-channel is as described in Fig.1. The driven oscillation is harmonic with a frequency equal to 4.75 kHz.