Electronic Supplementary Material (ESI) for Lab on a Chip.

Supplementary Information

Ultrasonic Microstreaming for Complex-trajectory Transport and Rotation of Single Particles and Cells

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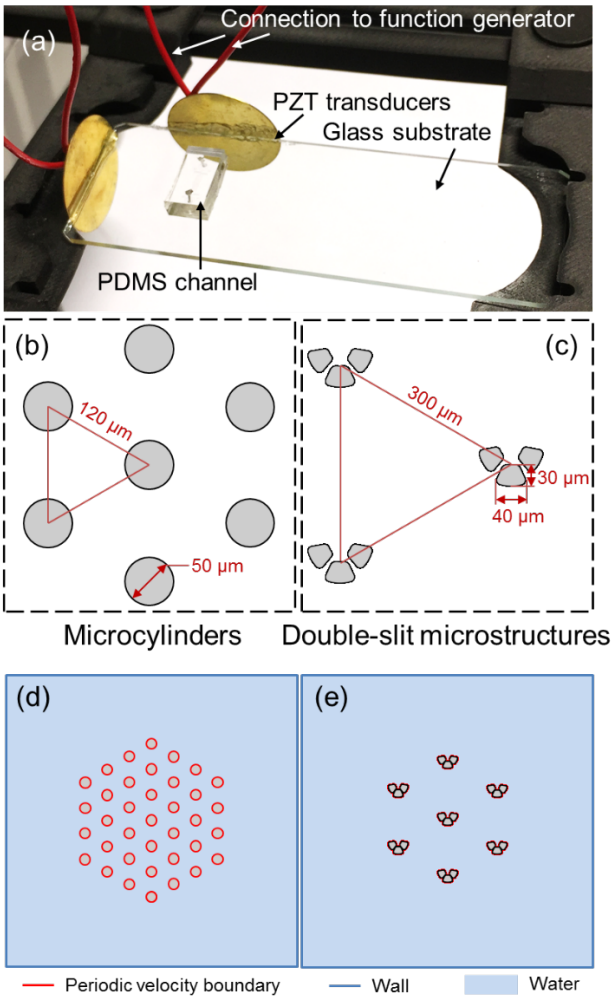

Figure S1. (a) Photograph of the experimental setup. The PDMS channel is firmly bonded with the glass substrate where two boarders are glued with PZT transducers. Within the PDMS channel, there are microstructures including (b) microcylinder array and (c) double-slit microstructures. The microstructures are distributed in a 4 mm by 10 mm area. The simulation uses the same geometries as designed in the microchannels, but with a smaller microstructures number, as shown in (d) and (e). In the simulation, the blue areas (2 mm by 2 mm) are defined as water, the boundaries along the microstructures (labeled as red) are defined as periodic velocity boundary.

Table S1. Material properties used in the simulation

Water		
Density	ρ_f	1000 kg m^{-3}
Speed of sound	c_f	1502 m s^{-1}
Compressibility	κ	4.45×10^{-10} Pa^{-1}
Thermal expansion coefficient	α	2.75×10^{-4} K^{-1}
Heat capacity at constant pressure	C_P	4.18×10^{3} J kg^{-1} K^{-1}
Thermal diffusivity	D	1.43×10^{-7} m^2 s^{-1}
Specific heat capacity ratio	γ	1.012
Viscosity ratio	β	0.333
Dynamic viscosity	μ	8.5×10^{-4} Pa s
Particle		
Density	ρ_p	1060 kg m^{-3}
Speed of sound	c_p	2350 m s^{-1}

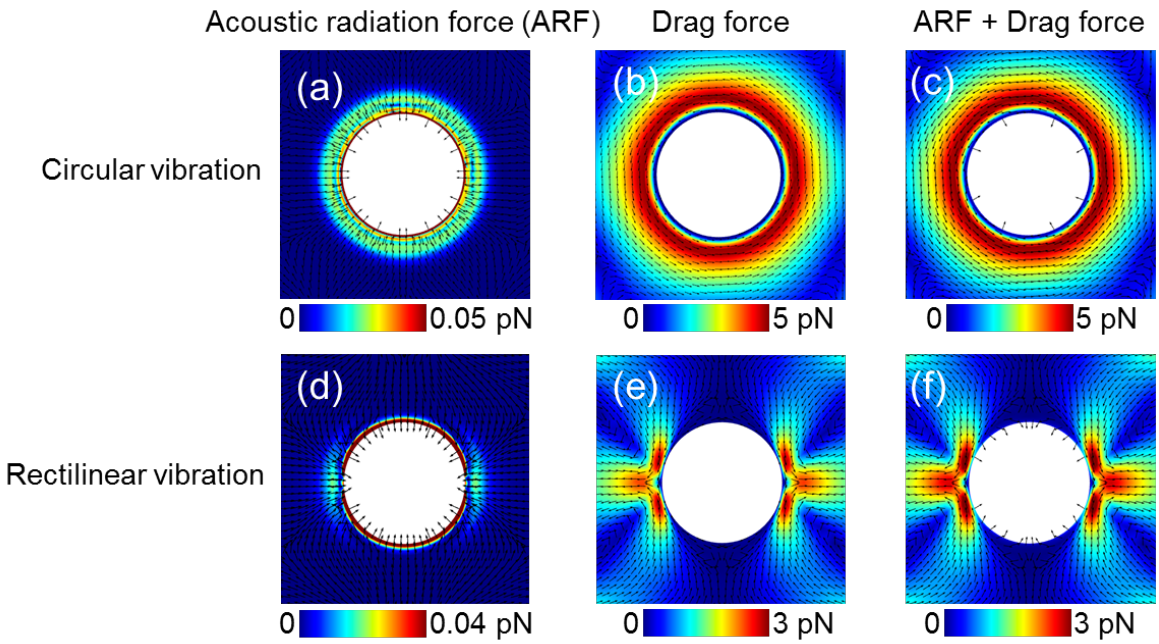

Figure S2. Comparison between acoustic radiation force (a, d), acoustic streaming induced drag force (b, e) and sum of the two forces (c, f) producing by a vibrating microcylinder. The colormaps represent the force value and the normalized arrow maps represent the force direction.

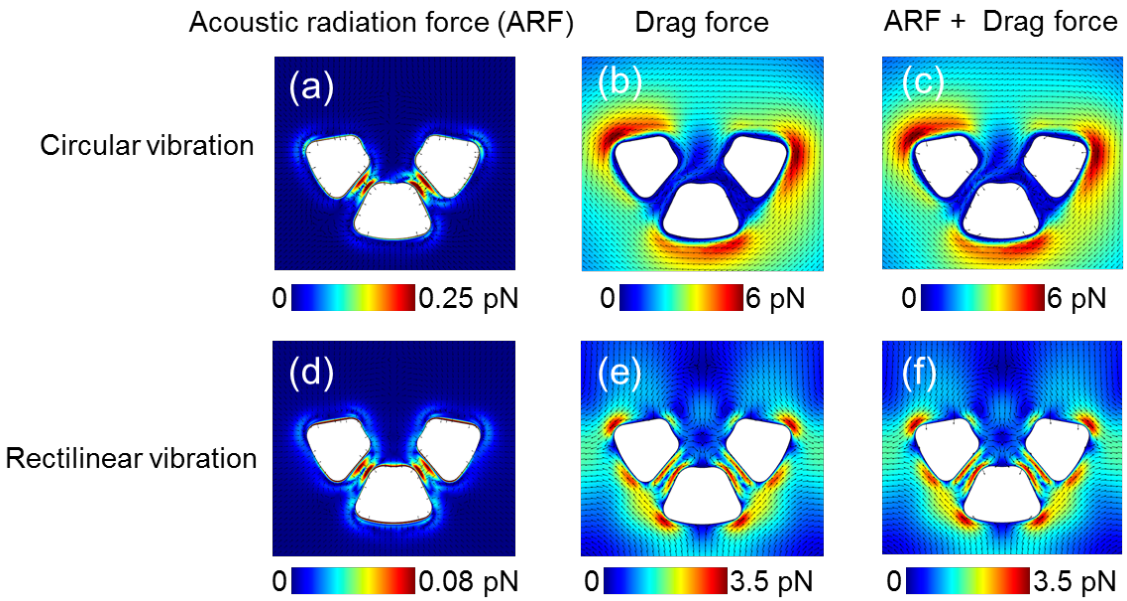

Figure S3. Comparison between acoustic radiation force (a, d), acoustic streaming induced drag force (b, e) and sum of the two forces (c, f) in a vibrating double-slit structure. The colormaps represent the force value and the normalized arrow maps represent the force direction.