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Droplet actuation by surface acoustic waves: an interplay between acoustic streaming and radiation pressure PHILIPPE BRUNET, IEMN, CNRS - UMR 8520, MICHAEL BAUDOIN, IEMN, CNRS - UMR 8520 & Universite Lille 1, OLIVIER BOU MATAR, IEMN, CNRS - UMR 8520 & Ecole Centrale de Lille, FARZAM ZOUESHTIAGH, IEMN, CNRS - UMR 8520 & Universite Lille 1, AIMAN-FILMS TEAM — Surface acoustic waves (SAW) are known to be a versatile technique for the actuation of sessile drops. Droplet displacement, internal mixing or drop splitting, are amongst the elementary operations that SAW can achieve, which are useful on lab-on-chip microfluidics benches. On the purpose to understand the underlying physical mechanisms involved during these operations, we study experimentally the droplet dynamics varying different physical parameters. Here in particular, the influence of liquid viscosity and acoustic frequency is investigated: it is indeed predicted that both quantities should play a role in the acoustic-hydrodynamic coupling involved in the dynamics. The key point is to compare the relative magnitude of the attenuation length, i.e. the scale within which the acoustic wave decays in the fluid, and the size of the drop. This relative magnitude governs the relative importance of acoustic streaming and acoustic radiation pressure, which are both involved in the droplet dynamics.

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