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# Improved understanding of Acoustic Relocation and Streaming phenomena for different Fluid configurations in a Microchannel

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The theoretical and experimental aspects of intriguing phenomena arising from the application of acoustic fields in a three-inlet flow configuration on inhomogeneous fluids in microchannels have been investigated in numerous studies. In this study, we numerically investigate the simpler and more common two-inlet flow configuration instead of the limited three-inlet flow configuration. The interface of this two-inlet flow configuration is expected to lie in the middle of the microchannel, assuming that the two fluids inlets are identical geometrically with equal fluid flow rates. However, it is difficult to maintain the fluid interface in the exact middle of the microchannel in the direction of flow. This study consists of configurations with shifted interface locations in order to accommodate the complication stated before. Evidently, an interface shift resulting in the higher impedance fluid occupying more area is more acoustically stable than the inverse case, a shift such that the low-impedance fluid occupies more area, When the configuration tends to be relatively stable or when the interface is in the middle of the channel, acoustic streaming dominates over acoustic relocation, but in relatively more unstable configurations, acoustic relocation surfaces. Conspicuously, there have been cases observed where acoustic streaming is suppressed in one half of the channel while surfacing in the other at certain time instances. As a result, we were able to prove that, in an inhomogeneous fluid configuration, the phenomena of acoustic relocation and acoustic streaming is strongly dependent on the location of the interface separating the two inhomogeneous fluids. This analysis's outcomes will benefit biological and medical applications for cell trapping, bio-particles, and bio-fluid separation applications.