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New insights into the migration patterns of a single capsule flowing in a pulsating microchannel. ALI LAFZI, AMIR HOSSEIN RAFFIEE, SADEGH DABIRI, Purdue University — Investigating the migration patterns of deformable capsules in inertial microchannels has been of great interest among researchers duo to its numerous biological applications such as sorting, separation, and filteration of cells. A huge drawback in conventional microfluidics is the inability to focus extremely small particles in the order of nanometers due to the requirement of designing a practically impossible elongated microchannel. Exploiting an oscillatory flow is one solution to this issue where the length that the capsule needs to travel to focus is virtually extended beyond the physical length of the device. Here we present results of simulation of such oscillatory flow of capsules in microchannels. The aforementioned improvement has been observed for capsule deformabilities and mechanisms to induce the pulsation used in our study. However, there is a limit to the system throughput beyond which, there is no single focal point for the capsule. Another advantage of having a pulsating microchannel is the ability to control the capsule focal point by changing the oscillation frequency according to the cases presented in this study. The capsule focusing point also depends on its deformability, flow rate, and the form of the imposed periodic pressure gradient.

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