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Controlling Lateral Inertial Migration Rate of Particles in Microchannels ARMIN KARIMI, SAMUEL BRAY, DINO DI CARLO, UCLA — It was previously demonstrated that particles in confined channels can migrate across streams due to the net inertial lift force acting on them. The initial location of particles within the channel cross-section is shown to effect the migration time as particles starting at different locations experience a different history of lift forces. This initial variation in distribution of focusing positions of particles upstream was a limiting factor in achieving precise control over the migration time in previous studies. In order to improve uniformity of the focusing position, a set of sequential cylindrical pillars is integrated to one side of the channel which is shown to aid particles in achieving a single stable equilibrium position, by inducing a net helical flow. The modified focusing positions are characterized as a function of pillar diameter and spacing for various channel Reynolds numbers. Using this initial focusing channel, a comprehensive numerical and experimental study is performed to characterize the range of lateral migration rate for particles as a function of particle position, and flow rates of each stream for a given finite Reynolds number and channel geometry. The tool developed in this study can be used to achieve precise migration characteristics for the microparticles crossing fluid streams in microchannels.

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