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Bending of Elastic Fibers in Viscous Flow: the Influence of Confinement[1] JASON WEXLER, Princeton Unversity, PMMH-ESPCI, HELENE BERTHET, NAWAL QUENNOUZ, OLIVIA DU ROURE, PMMH-ESPCI, HOWARD STONE, Princeton University, ANKE LINDNER, PMMH-ESPCI —
Applications such as microfluidic flow sensors or living micro-organisms often involve the deformation of a slender deformable body attached to a rigid boundary. Here we investigate the deformation of an anchored elastic fiber subject to transverse flow in a microfluidic device. Our fiber protrudes into a Hele-Shaw cell, a geometry with a flow field that varies rapidly near the wall but is otherwise approximately uniform. We fabricate our fibers directly in the microchannel using a photopolymerization method. This approach allows us not only to tune the geometry of the fiber (width, length), but also to control the fiber confinement (ratio of fiber height compared to channel height). For varying flow rates we measure how the shape of the fiber changes as a function of its geometry and the confinement. We analyze our results using dimensionless analysis and discuss simplified models of the deflection.

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