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Flow of a flexible fiber past an obstacle HECTOR LOPEZ, JEAN PIERRE HULIN, HAROLD AURADOU, FAST, Université Paris Sud, Orsay, France, VERONICA D'ANGELO, Grupo de Medios Porosos, FIUBA, Argentina — The transport of flexible biological or man made fibers by a flow is of interest in view of their potential applications in many different industrial fields. Here we study the deformation and transport of elastic fibers in a viscous Hele-Shaw flow with curved streamlines. The variations of the global velocity and orientation of the fiber follow closely those of the local flow velocity. The ratios of the curvatures of the fibers by the corresponding curvatures of the streamlines reflect a balance between elastic and viscous forces: this ratio is shown experimentally to be determined by a dimensionless Sperm number (Sp) combining the characteristic parameters of the flow (transverse velocity gradient, viscosity, fiber diameter/cell gap ratio) and those of the fiber (diameter, effective length, Young's modulus). The effective length is either the fiber length (short fiber case) or the characteristic size of the obstacle (long fiber case). For low values of Sp the ratio of the curvatures increases linearly with Sp. For values higher than 250, the fiber and the streamlines have the same curvature.

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