

Abstract Submitted
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Periodic motions of flexible fibers in shear flow¹ AGNIESZKA M. SLOWICKA, Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland, HOWARD A. STONE, Princeton University, Princeton, USA, MARIA L. EKIEL-JEZEWSKA, Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland — Numerical simulations of a single open flexible fiber entrained by shear flow are performed in the absence of both inertia and Brownian motion. The bead-spring model is used to account for hydrodynamic and elastic forces exerted on the fiber segments. The motion is studied for a wide range of the fiber bending stiffness ratios (i. e. the ratios of bending to hydrodynamic forces), aspect ratios and initial configurations. The essential finding is the existence of certain universal classes of periodic, quasi-periodic and steady modes, with different characteristic evolution of fiber shapes and different values of the orientation parameter. Types of the dominating modes, their lifetime and stability depend on the fiber bending stiffness and aspect ratios.

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