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Session G36: Suspensions: Fluid-Particle Interaction
10:35 AM–12:45 PM, Monday, November 19, 2018
Georgia World Congress Center Room: B408

Chair: Brian Utter, Bucknell University

Abstract: G36.00006 : Sedimentation of elastic loops in a viscous fluid*
11:40 AM–11:53 AM

Abstract

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We explore numerically the dynamics of elastic loops sedimenting in a viscous fluid. We show that an interplay between elastic and hydrodynamic forces in such a system can give rise to surprisingly rich variety of periodic orbits and stationary shapes. The two main parameters controlling the motion turn out to be the bending stiffness of the chain and its length. Stiff loops tend to keep the circular shape and settle vertically (with the axis of the ring perpendicular to gravity). As the bending stiffness is decreased, a rich zoology of other solutions appear, including swirling double and triple loops, rotating figure-of-eight, swinging periodic motions or tank-treading solutions. These solutions are characterized by different sedimentation velocities, which can be used to differentiate them experimentally. We comment on the relevance of these results to the biological soft matter.

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