Abstract Submitted
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An Elastic filament in a time-periodic linear shear flow VIPIN AGRAWAL, DHRDUBADITYA MITRA, NORDITA — We numerically study the dynamics of a free elastic filament in a highly viscous linear shear flow in the absence of inertia and brownian motion. We use a bead-spring model with Rotne-Pragor viscosity [1]. In time-independent shear flow the filament shows tumbling, C-buckling, and snake-turn, before becoming straight at late times [2,3,4], for different elasto-viscous numbers, Γ – Dimensionless ratio of viscous and elastic stress. In time-periodic flow (Period T), for $\Gamma < \Gamma_1$, as expected the filament comes back to it's initial position after one period. Surprisingly, for $\Gamma_1 < \Gamma < \Gamma_2$, we find two-cycle – the filament comes back to it's initial shape not after one but two periods. For $\Gamma > \Gamma_2$, we observe complex dynamical behaviors. Our results are independent of choice of initial conditions.
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