Highly elastic loops settling under gravity in a viscous fluid

5:38 pm – 5:51 pm
Presenter: Yevgen Melikhov (Institute of Fundamental Technological Research PAS)
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The gravitational settling of highly elastic non-Brownian loops in a viscous fluid at the Reynolds number much smaller than unity is investigated numerically. A loop is modelled as an almost inextensible bead-spring chain with small bending stiffness. Its dynamics are determined by the high-precision *Hydromultipole* numerical codes, which apply a multipole method corrected for lubrication. Starting from both planar and non-planar initial conditions, different attracting dynamical modes are observed for different values of the loop's flexibility, which is represented by the elasto-gravitation number B – a ratio of the gravitational and bending forces.

Here, we characterise the observed modes. In addition to the vertical, tilted, frozen rotating, tank-treading, swinging, and flapping modes identified earlier by Gruziel-Słomka *et al.* (*Soft Matt.* 15, 7262, 2019), two additional modes – rocking and gyrating-rocking-tank-treading – are presented. We focus on the evaluation and comparison of the characteristic time scales & velocities for all the modes, and the numerical analysis of the transitions (bifurcations) to a different mode at specific critical values of the elasto-gravitation number (Melikhov, Ekiel-Jezewska, *J. Fluid Mech.* 1013, A13, 2025).

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Contributed Session: Particle-Laden Flows: Deformable Particles
Time and date: 5:25 pm – 6:30 pm, Sunday November 23
Location: Session J24 // George R. Brown Convention Center, 362AD
Chair: Maria Ekiel-Jezewska, Institute of Fundamental Technological Research Polish Academy of Sciences