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Off-plane motion of an oblate capsule in simple shear flow ANNE-VIRGINIE SALSAC, CLAIRE DUPONT, FABIEN DELAHAYE, DOMINIQUE BARTHES-BIESEL, CNRS - UTC University (Compiegne, France), BIOMECHANICS & BIOENGINEERING LAB TEAM — As biomimetic models of red blood cells, non-spherical liquid-core capsules have received great attention to understand their dynamics in simple shear flow. They are also of interest for drug delivery applications having higher diffusion properties than spherical ones. Most studies have modeled the capsule motion placing the revolution axis in the shear plane, which is an equilibrium configuration in Stokes flow conditions and thus a special case. The present objective is to determine the stability of the equilibrium configurations of oblate capsules and investigate the effects of the capillary number Ca, inner-to-outer viscosity ratio λ and initial orientation. To solve the fluid-structure interaction problem, we use a numerical model coupling a finite element method for the capsule deformation with a boundary integral method for the internal and external flows. The equilibrium motions are found to be independent of the capsule initial inclination and to depend only on Ca. The tumbling and swinging regimes (characterized by the revolution axis in the shear plane) are found to be stable only until $Ca \sim 0.9$. Above, the capsule takes a rolling motion with its revolution axis normal to the shear plane. For $\lambda > 4$, only tumbling is stable at low Ca and rolling at higher Ca.

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