

Dynamics of a vesicle in viscous fluids

Shuwang Li, Kai Liu

Applied Math Department, Illinois Institute of Technology, Chicago

Recent experimental results on giant unilamellar vesicles (GUVs) show that mixed multiple lipid components on the surface of a membrane may decompose into coexisting phases with distinct compositions, with concomitant changes in the surface morphology. The driving forces for the evolution involve line tension along the phase boundaries, inhomogeneous surface/bending energy, and fluid forces. Here we are interested in exploring the emergent morphologies of a vesicle in shear flow and in extensional flow. In this talk, I will present the modeling and computation of a multicomponent vesicle and study its dynamics in viscous flow. Our numerical results suggest that the nonhomogeneous surface tension/bending, together with the flow, introduces nontrivial dynamics including locomotion, budding, tumbling and wrinkling.