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Does a particle encapsulated in a droplet always migrate towards its center?[1] LAILAI ZHU, FRANCOIS GALLAIRE, Laboratory of Fluid Mechanics and Instabilities, EPFL — The behavior of anuclear cells like red blood cells in flow have been extensively investigated. However, the dynamics of nuclear cells are much less explored. The objective of this work is to investigate the interplay between the stiff organelles and the surrounding deformable cell membrane and we consider a finite-size spherical particle inside a droplet subjected to an unbounded shear flow. A three-dimensional boundary integral implementation was developed to fully resolve the interface-structure interaction characterized by capillary number Ca and particle-droplet size ratio (between 0.2 to 0.6). For low Ca, the particle approaches the center of droplet. For Ca above a critical value, the time invariance is broken and the particle migrates to a closed orbit, reaching a limit cyle. We identify a supercritical Hopf bifurcation as a result of the balance between interfacial energy and viscous dissipation.

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