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Viscoelastic levitation ROBERTO ZENIT, ALFONSO CASTILLO, Univ Nacl Autonoma de Mexico, LAILAI ZHU, Princeton University, ON SHUN PAK, Santa Clara University — The effects of viscoelasticity in a flow have been shown to manifest themselves via symmetry breaking (Pak et al. 2012). In this presentation, we show a novel phenomenon that arises from this idea. We observe that when a dense sphere is rotated near a wall (the rotation being aligned with the wall-normal direction and gravity), it levitates at a fixed distance. Since the shear is larger in the gap (between the sphere and the wall) than that on the open side of the sphere, the elastic stresses are asymmetric leading to a net elastic force. The elastic force is balanced by the spheres net weight, which leads to the levitation of the rotating sphere at a stationary position from the wall. We report experiments for magnetically rotated spheres of various sizes and weights, in a Boger-type fluid. A scaling for the problem is proposed, along with supplementary numerical results.

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