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Locomotion of a Viscous Drop, Induced by the Internal Secretion: Boundary Effects

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When a dissolved substance is secreted from an internal source within a drop that is embedded in an immiscible viscous fluid, concentration variations at the surface result in interfacial stress gradients that ultimately induce surface motion and the locomotion of the drop. We have studied this type of motion when the drop is located near a solid wall or non-deformable liquid–liquid interface. The cases of plane and spherical boundaries have been considered. The dependence of the drop migration velocity on the location of the source and on the separation distance between the drop and the outer boundary as well as on the physical parameters of the system is reported. The dynamics of the drop is studied in the case of a fixed location of the source inside the drop, and in the case when it moves passively with the internal circulation.

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