

Self-propelling drops

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In 1805, in his very famous paper on the *Cohesion of Fluids*, Young understood the equilibrium condition of a liquid drop. We first recall this central result of the science of interfaces, and examine its practical validity and apparent exceptions. Then, we look at situations where Young's conditions cannot apply, and describe the possible spontaneous motions which can arise from such situations, a topic on which many progresses have been made for the last 10-15 years by different groups all around the world (Chaudhury, Ondarçuhu, Yoshikawa, Linke, *et al.*). We show in particular how such motions are observed on solids having a gradient of chemical composition, or a gradient of texture. In all these cases, the motion is related to an asymmetry in the solid wettability. We show that these motions can more generally be generated by other types of asymmetry, such as for drops having different interfaces, or for homogeneous drops placed on asymmetric solids. The latter systems thus allow to get motions in total wetting cases, and even in zero-wetting situations. After discussing the driving forces in these different examples, we finally propose scaling arguments for the velocity of the moving liquids.