

Flowing drops and partial coalescence

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The dynamics of drops in various contexts are described. After introducing the equations governing the motion of drops and the surrounding fluid, numerical simulations capturing their evolution are presented. Two cases are investigated in detail. First, the coalescence of a drop slowly coming into contact with a reservoir of the same fluid is described. Surprisingly, this coalescence may only be partial and a smaller drop may be left behind, to bounce on the interface. Physical insight into the mechanism behind partial coalescence is obtained through numerical simulations. Second, the motion of droplets in microfluidic devices is investigated. Streamlines inside and outside the droplets are computed and are used to examine the properties of the mixing that may be generated within those drops. Analytical computations reveals that this set-up is inherently more favorable to streamwise mixing than to transverse mixing.