

# Capillary Surfaces and Floating Bodies

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## Abstract

A fluid that fills a container partially is bounded by a capillary surface, if surface tension is acting in the surface that separates the fluid from the air above. We study the problem where in addition a rigid body  $B$  is floating on the fluid; then two more unknowns occur, namely the position of  $B$  and the curve  $C$  where the capillary surface meets the body  $B$ . We give a general existence theorem for such a configuration by variational methods. We formulate an obstacle Problem for the area integral in  $BV$  where the boundary of  $B$  (whose position is unknown) is the obstacle. In order to apply this result to a free-boundary problem for the Navier-Stokes equations, we investigate the stability of the curve  $C$ . This leads to an equation that can be solved by an implicit-function theorem of Nash-Moser type.