Fluid statics

\[-\nabla P + \rho \vec{g} = \rho \vec{a}\]

with gravity, \( \vec{g} = g \hat{k} \) & no acceleration

\[P(z) = P_o + \rho gz\]

Acceleration

with gravity, \( \vec{g} = -g \hat{j} \) & an acceleration, \( \vec{a} = a \hat{i} \)

\[P(x, y) = -\rho ax - \rho gy + P_o\]

\[\tan \theta = \frac{a}{g}\]

Buoyancy

\[F_B = \rho g V\]

where \( \rho \) is the density of a displaced liquid, and \( V \) is the volume of a displaced liquid.

Surface Tension

Young-Laplace equation

For a curved liquid-air interface, defined by two radii of curvature, \( R_1 \) & \( R_2 \)

\[P_i - P_o = \sigma \left( \frac{1}{R_1} + \frac{1}{R_2} \right)\]

Contact angle, \( \theta \)

\[\cos \theta = \frac{\sigma_{SG} - \sigma_{SL}}{\sigma_{LG}}\]