Fluids

$F = ma$

$\vec{u}$ is velocity

$\vec{u}(x, y, z, t)$

$\frac{\partial u}{\partial t}$ ← partial

$$m \frac{Du}{Dt} = f = f_g + f_p + f_v$$

pressure

gravity

viscosity

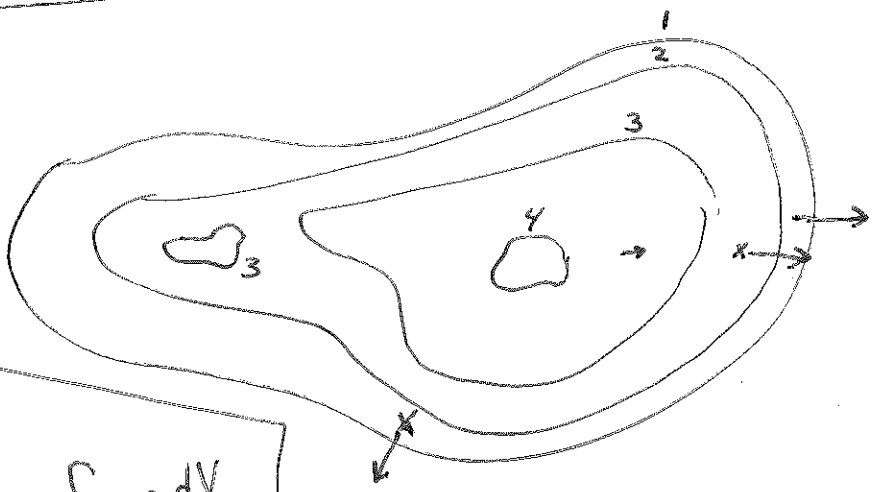
↑ material derivative

gravity $f_g = mg$

Pressure

$f_p = -\nabla p \, V$

↑ volume



$$f_p = \int_{\partial\Omega} -p\vec{n} \, dA = -\int_{\partial\Omega} p \, d\vec{S} = -\int_{\Omega} \nabla p \, dV$$

↑ boundary

gradient theorem

direction normal to contours

proportional to rate of pressure change

$f_p \approx -\nabla p \, V$