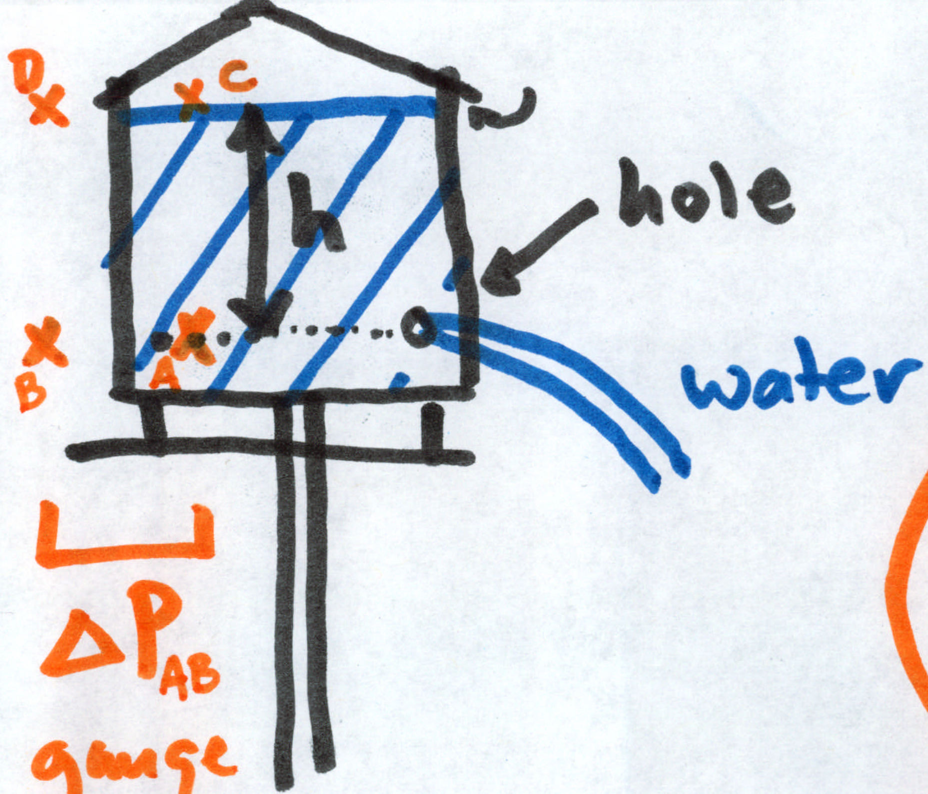


ΔP_{AB}

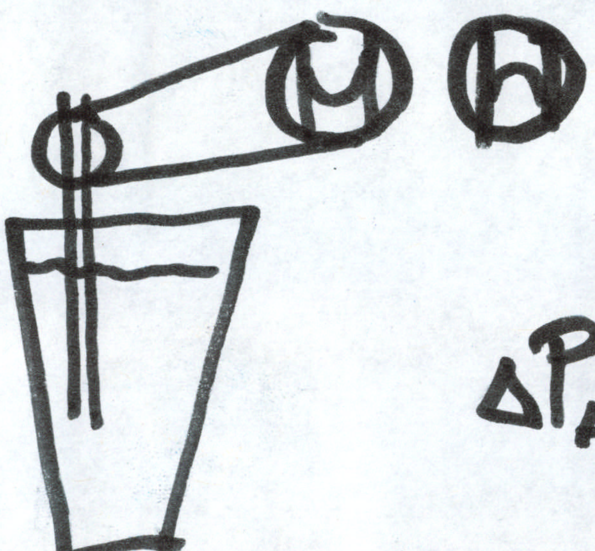
gauge pressure.

Normal blood pressure

$\underbrace{120}_{\text{mm Hg}} / \underbrace{80}_{\text{mm Hg}}$

760 mm Hg ≈ 1 atm

gauge pressure: pressure above environment



$h \sim 4\,m$

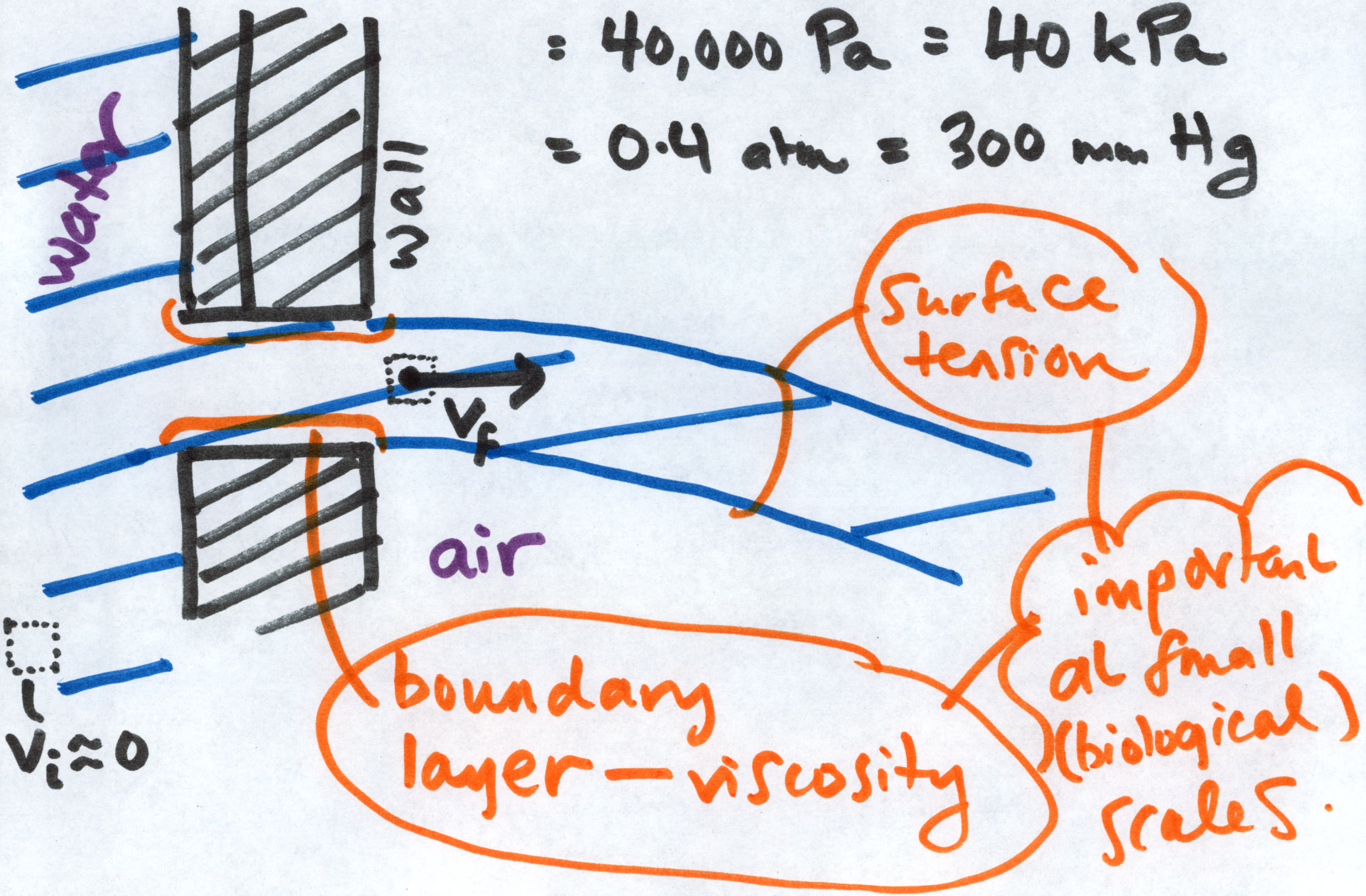
$\rho_{air} \lll \rho_{water}$

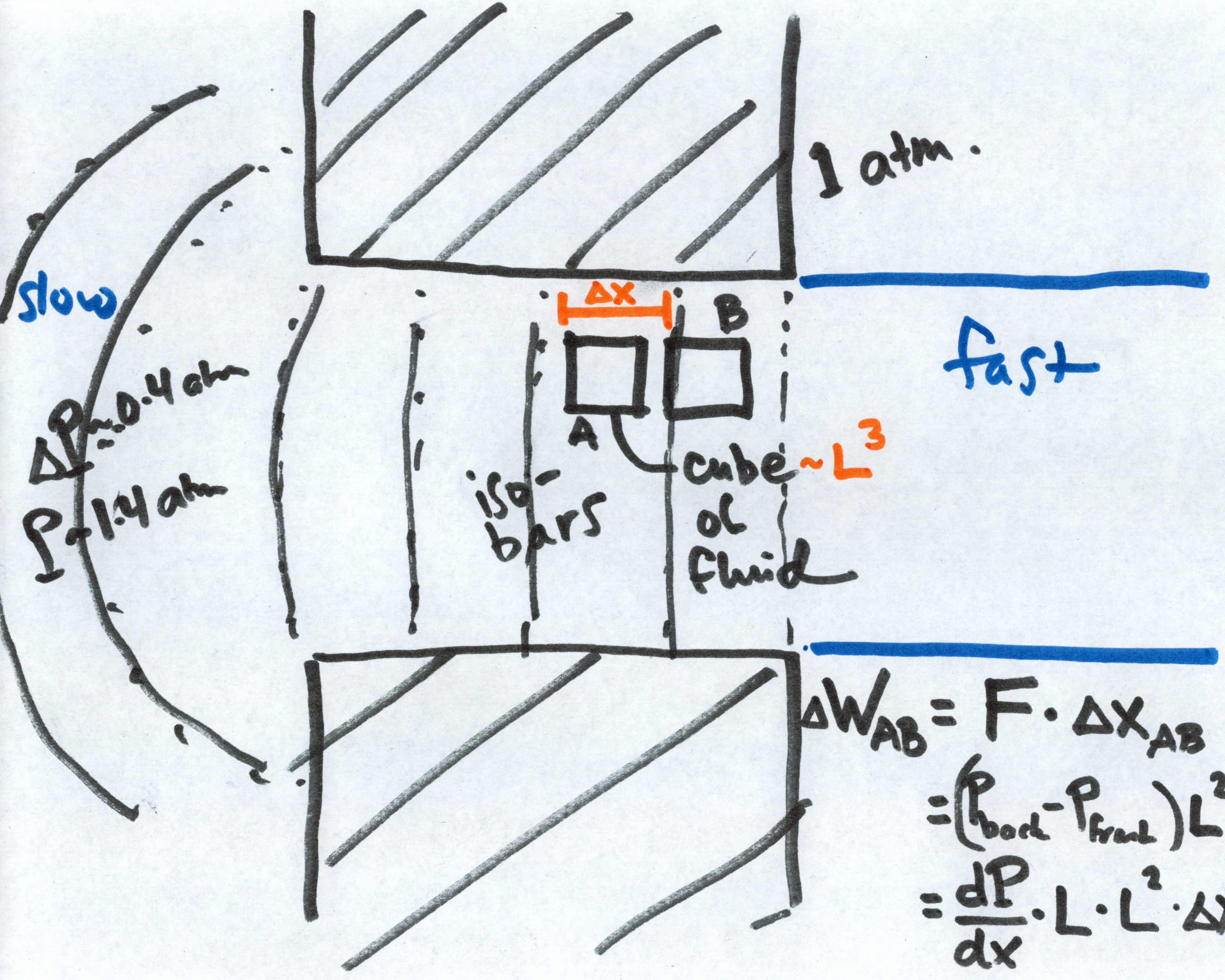
$\Delta P_{AB} = \rho_{water} g h - \rho_{air} g h = \Delta \rho g h$

roughly: $\Delta P_{AB} = \left(1000 \frac{kg}{m^3}\right)\left(10 \frac{m}{s^2}\right)(4\,m)$

$= 40{,}000\ Pa = 40\ kPa$

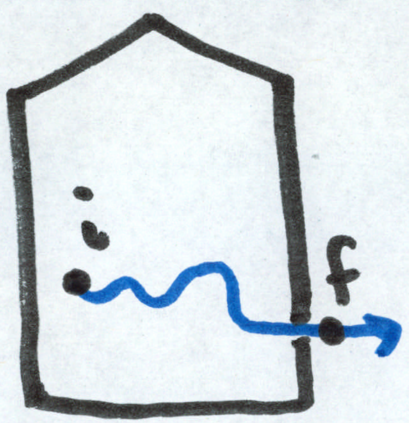
$= 0.4\ atm = 300\ mm\ Hg$





$$\Delta W_{AB} = F \cdot \Delta x_{AB}$$
$$= (P_{back} - P_{front}) L^2 \cdot \Delta x_{AB}$$
$$= \frac{dP}{dx} \cdot L \cdot L^2 \cdot \Delta x_{AB}$$

$$\Delta W_{AB} = \underbrace{\underbrace{\underbrace{\frac{dP}{dx}}_{\text{pressure gradient}} \cdot \underset{\uparrow}{\underset{\text{distance from front to back}}{L}} \cdot \underbrace{L^2}_{\text{area of the face}}}_{\text{force}} \cdot \underbrace{\Delta X_{AB}}_{\text{distance through which the force acted}}}_{\text{work}}$$



$$W_{if} = \int_i^f dW = \overbrace{\int_i^f \vec{F}(\vec{x}) \cdot d\vec{x}}^{\text{path integral}}$$

$$W_{if} = \int_i^f \frac{dP}{dx} \cdot L^3 \cdot dx = L^3 \underbrace{\int_i^f \frac{dP}{dx} dx}$$

$$W_{if} = L^3 \left[P_f - P_i\right] = K = \frac{1}{2} m V_f^2$$

$$P_f - P_i = \frac{1}{2} \underbrace{\frac{m}{L^3}}_{\rho} V_f^2$$

Bernoulli's principle