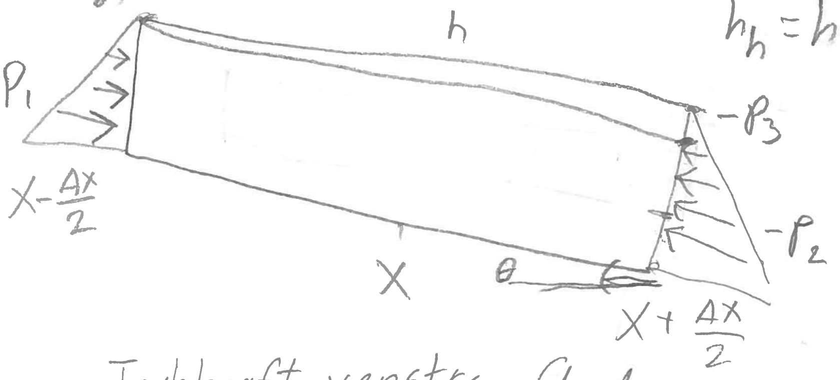
# Udregninger for $P_2$ $P_3$



$h_v = h - \frac{\partial h}{\partial x}\frac{\Delta x}{2}$

$h_h = h + \frac{\partial h}{\partial x}\frac{\Delta x}{2}$




$\cos(\theta) \simeq 1$

Trykkraft venstre flade

$$\int_0^{h_v} \rho g (h_v - z)\cdot b(z)\,dz = P_1$$

Trykkraft højre flade

$$-\int_0^{h_h} \rho g (h_h - z)\cdot b(z)\,dz = -\int_0^{h_v} \rho g (h_v - z) b(z)\,dz - \int_0^{h_v} \rho g (h_h - h_v) b(z)\,dz$$

$$-\int_{h_v}^{h_h} \rho g (h_h - z)\, b(z)\,dz = -P_1 - P_2 - P_3$$

$$P_3 = -\int_{h_v}^{h_h} \rho g (h_h - z) b(z)\,dz \simeq -\rho g\, b(h) \frac{1}{2}\left(\frac{\partial h}{\partial x}\Delta x\right)^2$$

$$P_2 = -\int_0^{h_v} \rho g (h_h - h_v) b(z)\,dz \simeq -\rho g \frac{\partial h}{\partial x}\Delta x\, A_v$$

Udregninger for $P_2$ $P_3$ (2)

$$P_3 = -\int_{h_v}^{h_h} \rho g (h_h - z)\, b(z)\, dz \qquad h_v = h - \frac{\partial h}{\partial x}\frac{\Delta x}{2} \quad h_h = h + \frac{\Delta x}{2}\cdot\frac{\partial h}{\partial x}$$

antager $b(z)$ ~~der~~ er konstant

$$= -\rho g b(z) \int_{h_v}^{h_h} (h_h - z)\, dz = -g\rho b(h) \left( \frac{\left[ h_h - z \right]^2_{h_v}}{2} \right)$$

$$= -g\rho b(h) \left( \left(\frac{h_h - h_h}{2}\right)^2 - \left(\frac{h_h - h_v}{2}\right)^2 \right)$$

$$= -g\rho b(h) \left( 0 - \left( \frac{h + \frac{\partial h}{\partial x}\frac{\Delta x}{2} - \left(h - \frac{\partial h}{\partial x}\frac{\Delta x}{2}\right)}{2} \right)^2 \right)$$

$$= -g\rho b(h) \cdot \frac{1}{2} \left( \frac{\partial h}{\partial x}\Delta x \right)^2$$

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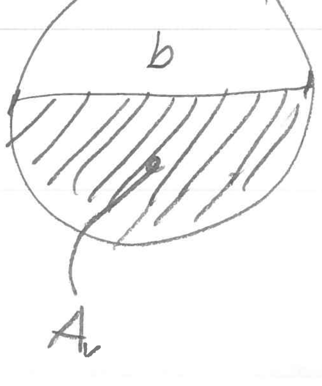
$$P_2 = -\int_0^{h_v} \underbrace{\rho g (h_h - h_v)}_{\text{konstant}}\, b(z)\, dz \qquad b(z) = 2 \cdot \sqrt{z^2 + z \cdot d}$$

$$= \underbrace{-\rho g (h_h - h_v)}_{G} \int_0^{h_v} b(z)\, dz = G \left[ \frac{b(z)^2}{2} \right]_0^{h_v} = G \left( \frac{b(z)^2}{2} - \frac{b(0)^2}{2} \right)$$

$$= G\left( \frac{b(h)^2}{2} - 0 \right) = -\rho g \left( h + \frac{\partial h}{\partial x}\frac{\Delta x}{2} - \left(h - \frac{\partial h}{\partial x}\frac{\Delta x}{2}\right) \right) \cdot \frac{b(h_v)^2}{2}$$

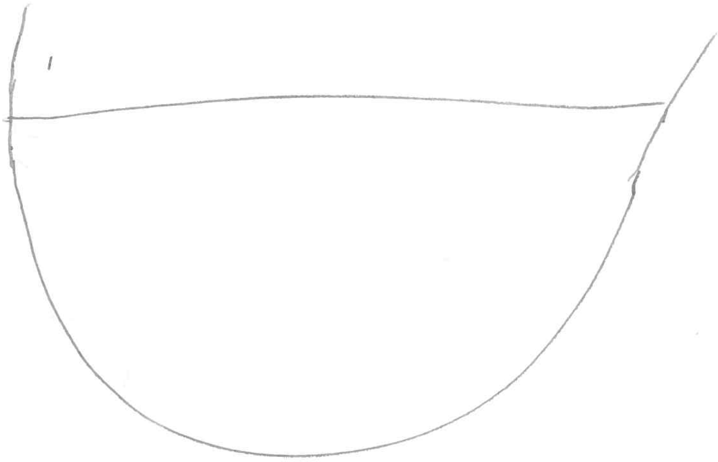
$$= -\rho g \frac{\partial h}{\partial x} \Delta x \cdot A_v$$



$$B(z) = 2\sqrt{z^2 + z \cdot d}$$

$$G\left(\frac{(2\sqrt{z^2+z\cdot d})^2}{2}\right)_0^{h_v} = G\left(\frac{(2\sqrt{h_v^2+h_v\cdot d})^2}{2} - 0\right)$$

$$= G\left(\frac{\left(2\sqrt{\left(h - \frac{\partial h}{\partial x}\frac{\Delta x}{2}\right)^2 + \left(h - \frac{\partial h}{\partial x}\frac{\Delta x}{2}\right)\cdot d}\right)^2}{2}\right)$$



$$P_1 - P_1 - P_2 - P_3 = \cancel{P_1} - P_1 - P_2 - P_3$$

$$= -\rho g \frac{\partial h}{\partial x}\Delta x \underbrace{\left(A_v + \frac{1}{2} b(h) \frac{\partial h}{\partial x}\Delta x\right)}_{A}$$

$$= -\rho g \frac{\partial h}{\partial x}\Delta x A$$