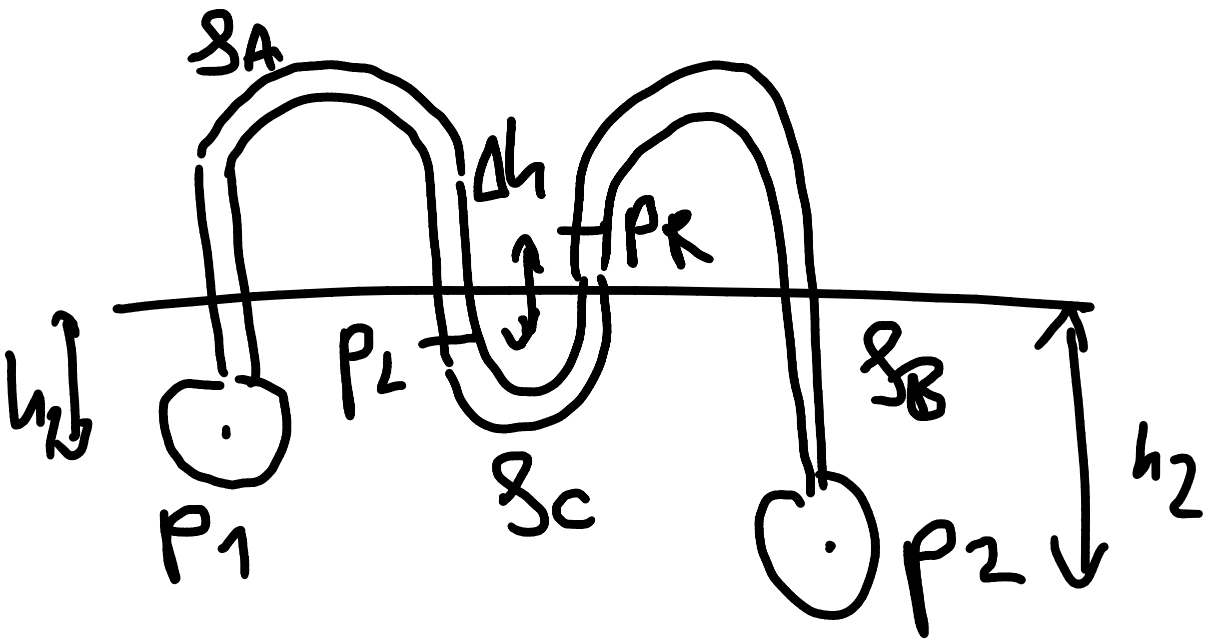
U - Rohrmanometer



$$\nabla p = \rho \vec{k}$$

$$p + \rho g z = \text{const}$$

ges: $p_1 - p_2$

$$p_1 - \rho_A g h_1 = p_L - \rho_A g \frac{\Delta h}{2}$$

$$\hookrightarrow p_L = p_1 + \rho_A g \left(\frac{\Delta h}{2} - h_1\right) \quad (I)$$

$$p_2 - \rho_B g h_2 = p_R + \rho_B g \frac{\Delta h}{2}$$

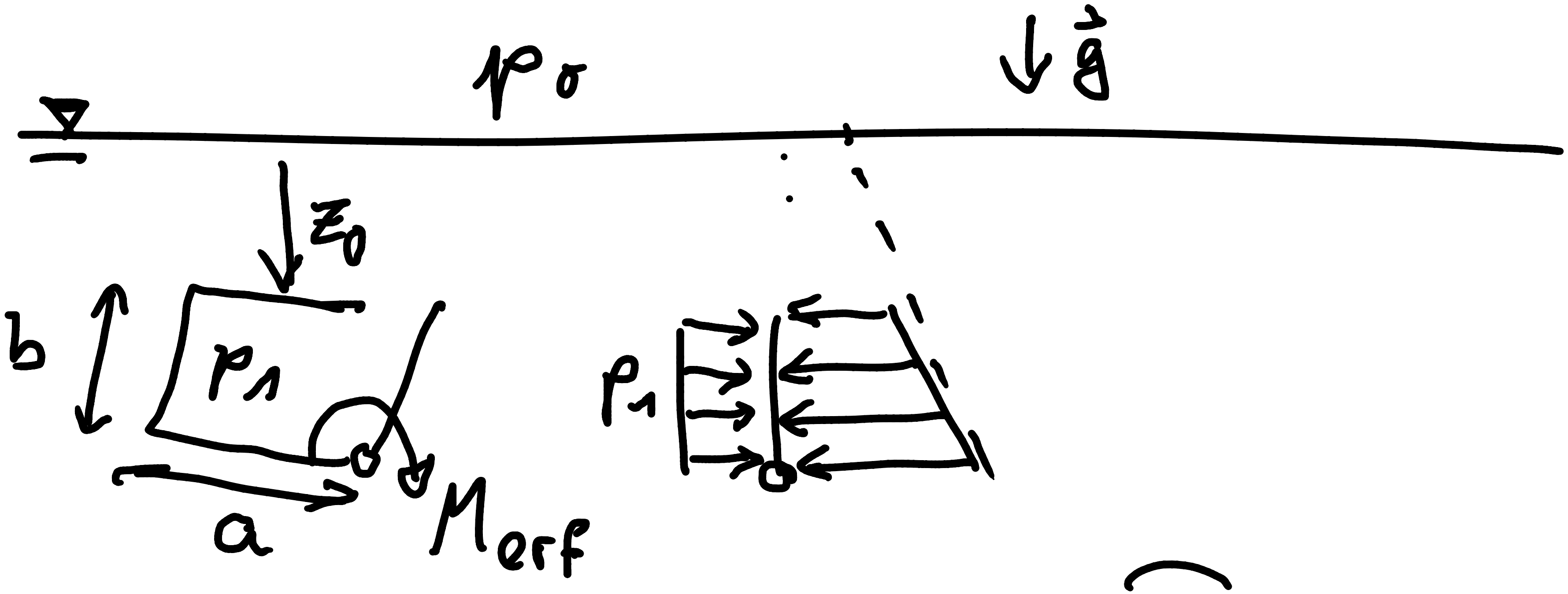
$$\hookrightarrow p_R = p_2 - \rho g \left(\frac{\Delta h}{2} + h_2\right) \quad (II)$$

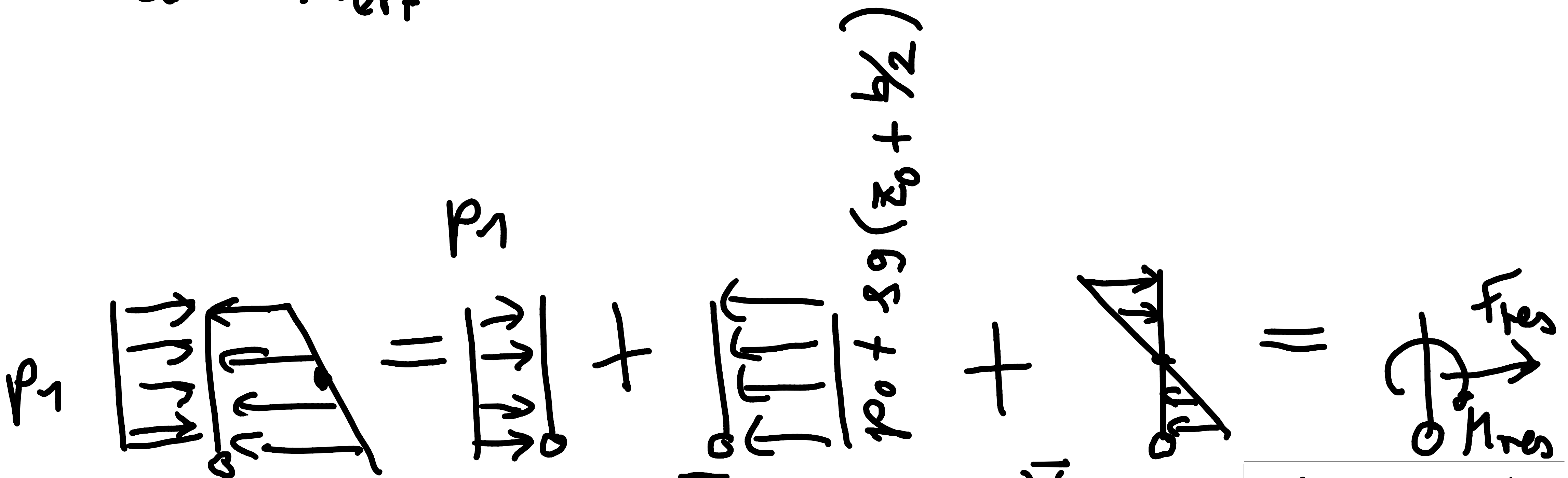
$$p_L - p_R = \rho_C g \Delta h \quad III$$

I & II in III

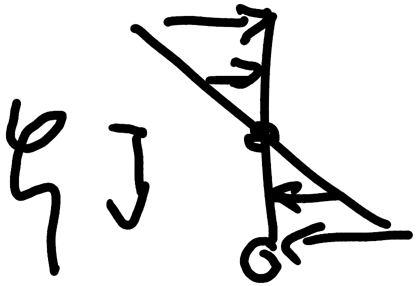
$$\left[p_1 + \rho_A g\left(\frac{\Delta h}{2} - h_1\right)\right] - \left[p_2 - \rho_B g\left(\frac{\Delta h}{2} + h_2\right)\right] = \rho_C g \Delta h$$

$$p_1 - p_2 = \rho_C g \Delta h - \rho_A g\left(\frac{\Delta h}{2} - h_1\right) - \rho_B g\left(\frac{\Delta h}{2} + h_2\right)$$

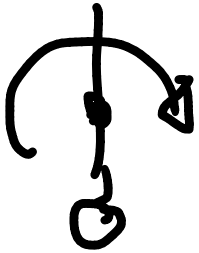




$$F_{res} = p_1 b c - \left[p_0 + \varrho g\left(z_0 + \frac{b}{2}\right)\right] b c + 0$$



$$p_{III} = \varrho g \zeta \quad (\text{"Zeta"})$$



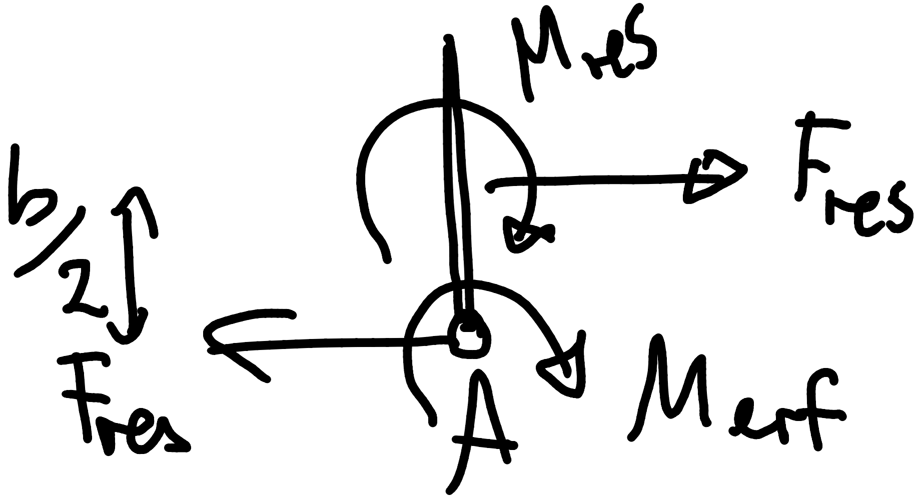
$$\overset{\curvearrowright}{M}_{res} = \iint_A p_{III}\, \zeta \, dA = \varrho g \underbrace{\iint_A \zeta^2 \, dA}_{I_\square}$$

$$I_\square = \frac{\text{höhe}^3 \, \text{breite}}{12} = \frac{b^3 c}{12}$$

$I_\square$: "Flächenträgheitsmoment"

$$\overset{\curvearrowright}{M}_{res} = \varrho g \frac{b^3 c}{12}$$

Freikörperbild



$$\overset{\curvearrowright}{A}: M_{res} + M_{erf} + \frac{b}{2} F_{res}$$

$$\underline{\underline{M_{erf}}} = -M_{res} - \frac{b}{2} F_{res} = -\rho g \frac{b^3 c}{12} - \frac{b^2 c}{2} \cdot \Big[\rightarrow$$

$$\rightarrow \Big[p_1 - p_0 - \rho g z_0 - \rho g \, b/2 \Big] =$$

$$\underline{\underline{\rho g \frac{b^3 c}{6} + \rho g \frac{b^2 c z_0}{2} + (p_0 - p_1) \frac{b^2 c}{2}}} \; //$$