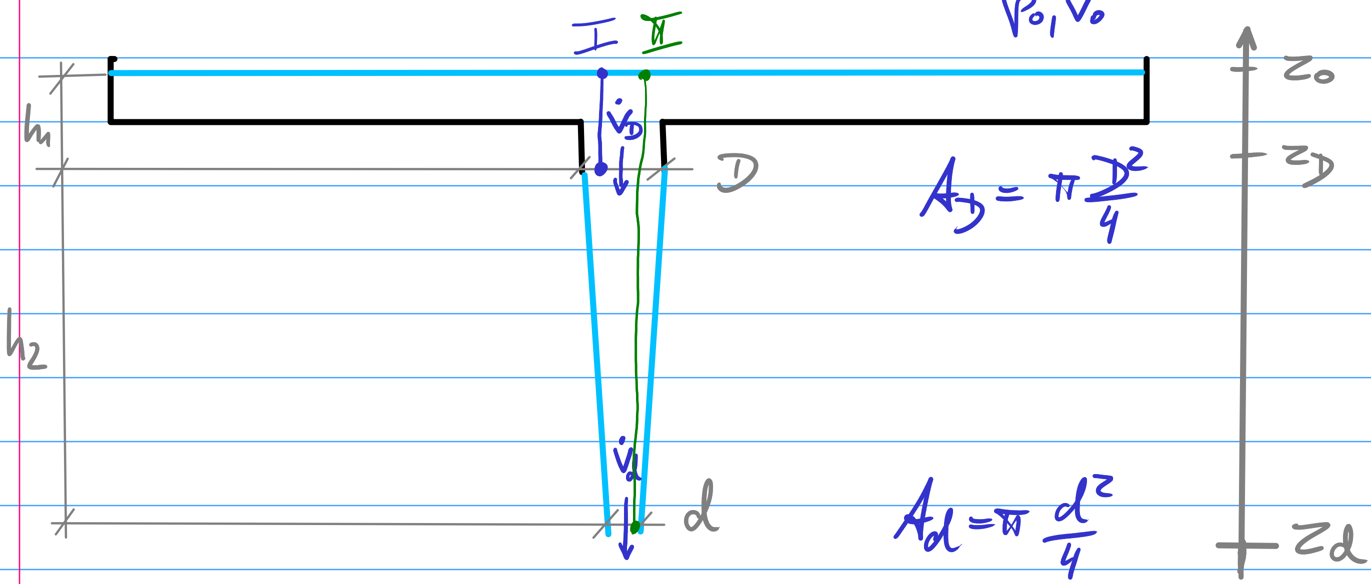
# Task 3.2




$\dot V_D = \dot V_d \Rightarrow A_D \cdot v_D = \underset{?}{A_d} \cdot v_d$    This equation to get the diameter d.

$\Rightarrow$ For that we need both velocities $v_D$ and $v_d$ !

$\Rightarrow$ Two Bernoulli-Eq. for two different streamlines!

Streamline I :

$$p_0 + \rho \frac{v_0^2}{2} + g\rho z_0 = p_D + \rho \frac{v_D^2}{2} + g\rho z_D \quad | -g\rho z_D$$

$$\cancel{p_0} + \cancel{\rho \frac{v_0^2}{2}} + g\rho \underbrace{(z_0 - z_D)}_{h_1} = \cancel{p_D} + \rho \frac{v_D^2}{2}$$

$$p_D = \cancel{p_0}$$

like last time:

$$A_0 \gg A_D, A_d \Rightarrow \rho \frac{v_0^2}{2} \ll \rho \frac{v_D^2}{2}$$

$$\Rightarrow \quad g \cancel{\rho} h_1 = \cancel{\rho} \frac{v_D^2}{2} \Rightarrow v_D = \sqrt{2 g h_1}$$

Streamline II

$$\cancel{p_0} + \cancel{\rho \frac{V_0^2}{2}} + g\rho z_0 = \underbrace{\cancel{p_d}}_{=p_0} + \rho \frac{V_d^2}{2} + g\rho z_d$$

like before

$$\Rightarrow \quad g\cancel{\rho}\underbrace{(z_0 - z_d)}_{h_1+h_2} = \cancel{\rho}\frac{V_d^2}{2}$$

$$\Rightarrow \quad V_d = \sqrt{2g(h_1+h_2)}$$

(*) $\Rightarrow \quad A_d = A_D \dfrac{V_D}{V_d} =$ (Taschenrechner)

$\Rightarrow \quad d = \sqrt{\dfrac{4A_d}{\pi}} =$ ( " )