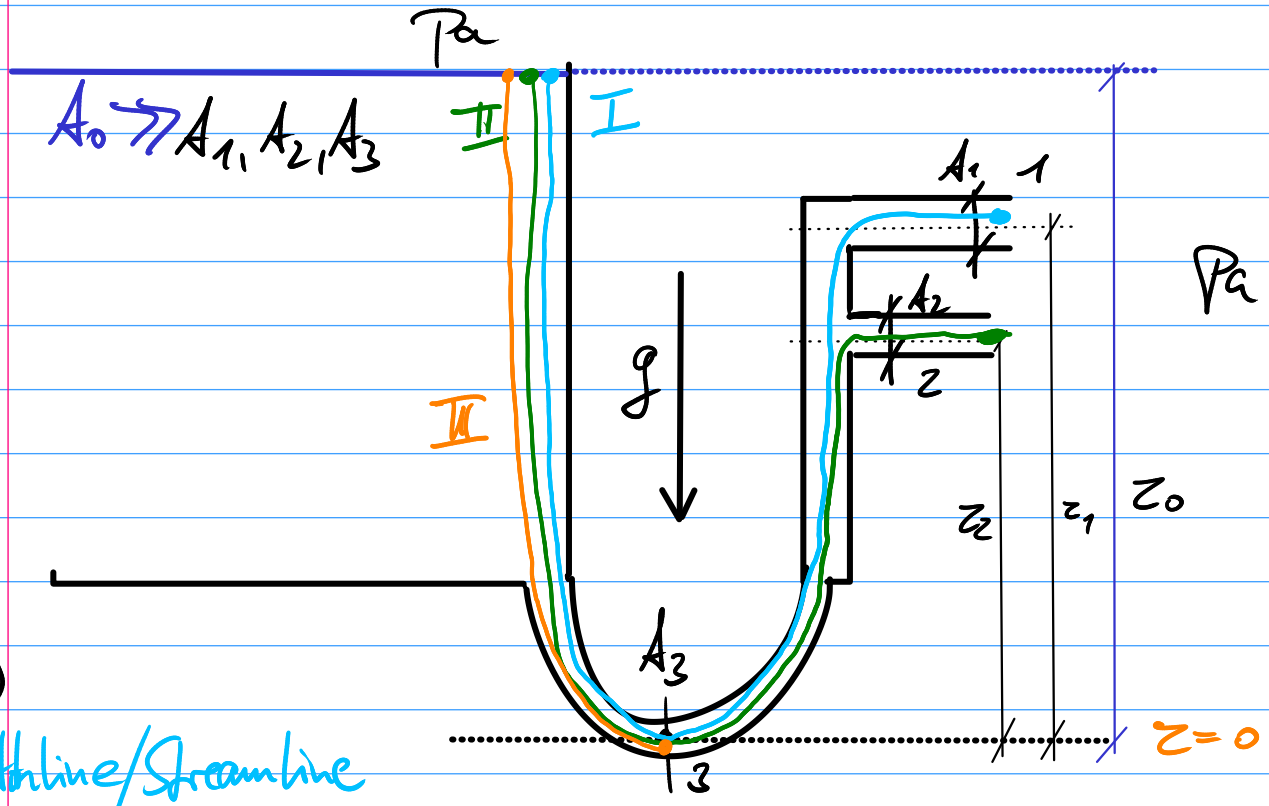
Tasks 6.2



a)

Pathline/Streamline

I

$$\cancel{p_0}^{p_a} + \rho \cancel{\frac{V_0^2}{2}} + g\rho z_0 = \cancel{p_1}^{p_a} + \rho \frac{V_1^2}{2} + g\rho z_1$$

$A_0 \gg A_1 \Rightarrow \rho \frac{V_0^2}{2} \ll \rho \frac{V_1^2}{2}$

$p_0 = p_1 = p_a$

$$\Rightarrow g\cancel{\rho} z_0 = \cancel{\rho} \frac{V_1^2}{2} + g\cancel{\rho} z_1 \Rightarrow \frac{V_1^2}{2} = g(z_0 - z_1)$$

$$\Rightarrow \quad V_1 = \sqrt{2g(z_0 - z_1)}$$

II ... the same:

$$V_2 = \sqrt{2g(z_0 - z_2)}$$

Task 6.2 (cont'd)

b) $\dot{V}_1 = \dot{V}_2$

$v_1 A_1 = v_2 A_2 \quad | : v_2$

$\Rightarrow \quad A_1 \frac{v_1}{v_2} = A_2$

c) static pressure p_3 ?

III Streamline

$$p_0 + \cancel{\rho \frac{v_0^2}{2}} + g\rho z_0 = p_3 + \rho \frac{v_3^2}{2} + \cancel{g\rho z_3} \quad (*)$$

p_3 ↑ ? ; $\frac{v_3^2}{2}$ ↑ We need this term!

$p_0 = p_a$ given ✓

$A_0 \gg A_3 \Rightarrow \rho \frac{v_0^2}{2} \ll \rho \frac{v_3^2}{2}$ ✓

$z_3 = 0$ ✓

v_3 from continuity eq.

$$\dot{V}_3 = \dot{V}_1 + \dot{V}_2$$

$\Rightarrow A_3 v_3 = A_1 v_1 + A_2 v_2$

$\Rightarrow \quad v_3 = \frac{1}{A_3} (\quad \dots \quad)$

$= 6 \text{ m/s}$

A_3 given
A_2 = from b
A_1 = given

$(*) \Rightarrow \quad p_3 = p_0 + g\rho z_0 - \rho \frac{v_3^2}{2} = 1{,}82 \text{ bar}$