Bernoulies Eq ;

$$\text{total head} = \frac{P}{\gamma} + Z \quad \frac{V^2}{2g} = \text{Constant} = h$$

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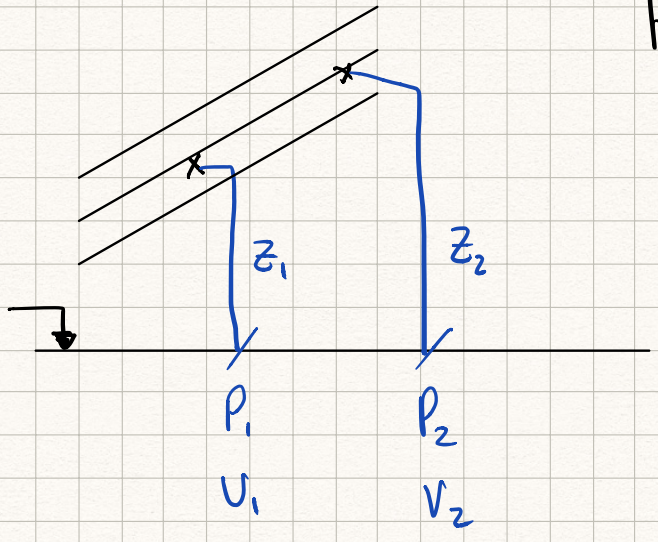
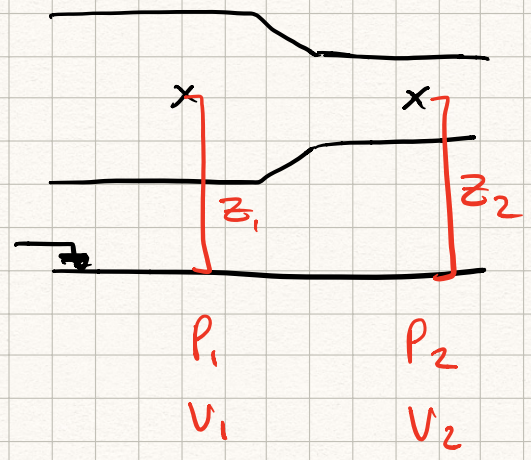
$P_1$ $P_2$
$Z_1$ $Z_2$
$V_1$ $V_2$
$= C$ $= C$

Given
friction = 0
$V_1 = V_2$



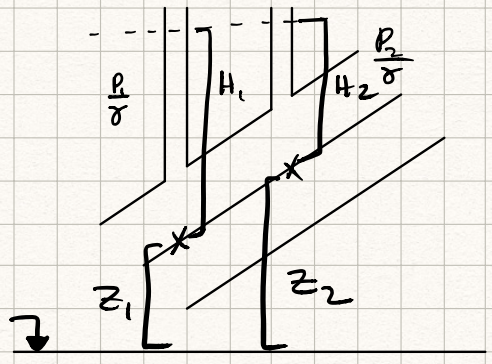

$$\frac{P_1}{\gamma} + Z_1 = \frac{P_2}{\gamma} + Z_2 \quad \text{(velocity cancels out)}$$




$z_1 = z_2$ ∴ cancel out

∴ $h_1 = h_2$

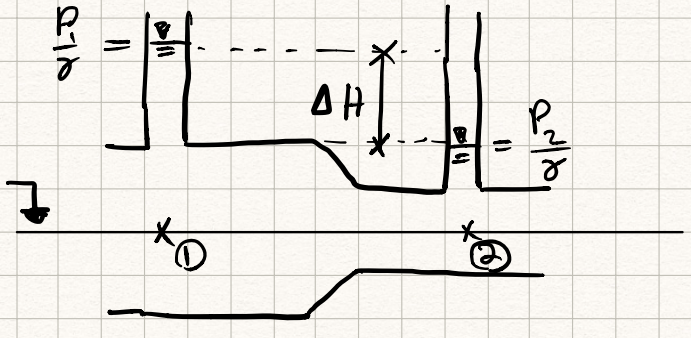
$$\frac{P_1}{\gamma} + \frac{V_1^2}{2g} = \frac{P_2}{\gamma} + \frac{V_2^2}{2g}$$




$V_1$ $V_2$

$P_1$ $P_2$

Piezometer { depth = $\frac{P}{\gamma}$, elevation $\frac{P_2}{\gamma}$




$V_1 = \frac{1}{2} V_2$

$V_1 = ?$ $\{f(H\Delta)\}$

$h_1 = h_2$

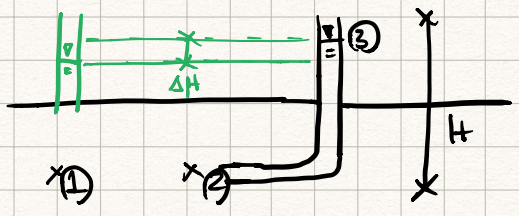
$$\frac{P_1}{\gamma} + \frac{V_1^2}{2g} + \cancel{z_1} = \cancel{z_2} + \frac{V_2^2}{2g} + \frac{P_2}{\gamma}$$

($\frac{1}{2}V_2$)

$$\left(\frac{P_1 - P_2}{\gamma}\right) = \frac{3(V_1)^2}{2g}$$

$$\Delta H = \frac{3(V_1)^2}{2g} \Rightarrow V_1 = \sqrt{\frac{2g}{3}\Delta H}$$

# Stagnation Tube




$V_1$ $\quad V_2 = 0$

$P_1$ $\quad P_2$

~~$z_1$~~ $\quad$ ~~$z_2$~~

**B.Eq** $\quad h_1 = h_2$

$$\frac{P_1}{\gamma} + \frac{V_1^2}{2g} = \frac{P_2}{\gamma} + \cancel{\frac{V_2^2}{2g}}^{\,=0}$$

**E.Eq** ②, ③

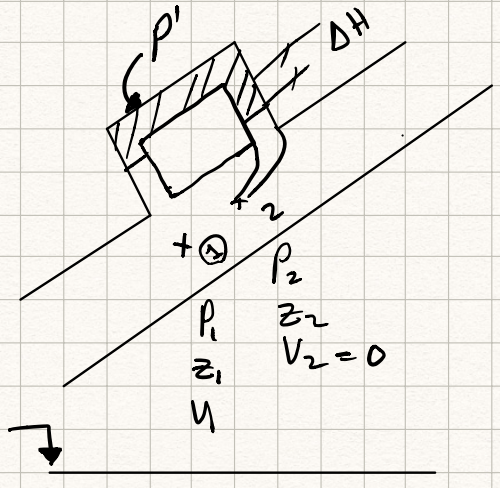
$$P_2 - \gamma H = P_3 = 0$$

$$\frac{P_2}{\gamma} = H$$

$$\boxed{\text{B.E.}} + \boxed{\text{E.E.}} = \frac{P_1}{\gamma} + \frac{V_1^2}{2g} = H$$

$$H_2 - H_1 = \Delta H = \frac{V_1^2}{2g}$$

# Flowmeter




$h_1 = h_2$

BE: $$\boxed{\frac{P_1}{\gamma} + z_1 + \frac{V_1^2}{2g} = \frac{P_2}{\gamma} + z_2}$$

EE: $P_1$ I $\Sigma \gamma h = P_2$

$$\boxed{P_1 - \gamma H_1 + \gamma' \Delta H + \gamma H_2 = P_2}$$

Ex.