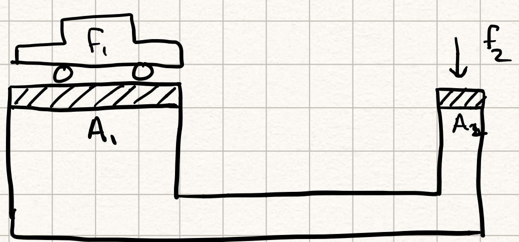
Pascals law (Practical Example)

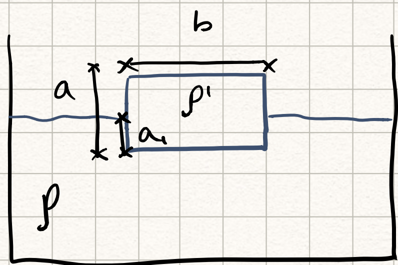


$F = PA$

$P_2 = \frac{F_2}{A_2}$

$P_1 = P_2 \Rightarrow P_1 A_1 = F_1$

$\Rightarrow F_1 = \frac{F_2}{A_2} A_1$



FBD

$\Sigma F_y = 0 \Rightarrow F_B = W$

$W = \forall \rho' g = (abc)\rho' g$

$F_B = \forall_s \gamma = (a_1 bc)\gamma$

$\gamma = \rho g$

$\gamma' = \rho' g$

$\Longrightarrow (a_1 \cancel{bc})\gamma = (a\cancel{bc})\gamma'$

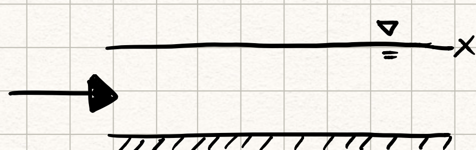
$a_1 \gamma = a\gamma'$

$a_1 = a\frac{\gamma'}{\gamma}$

End at Lecture 6

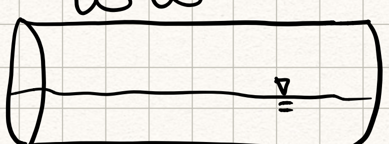
Fluids in Motion (Chapter 4)

Under Pressure flow



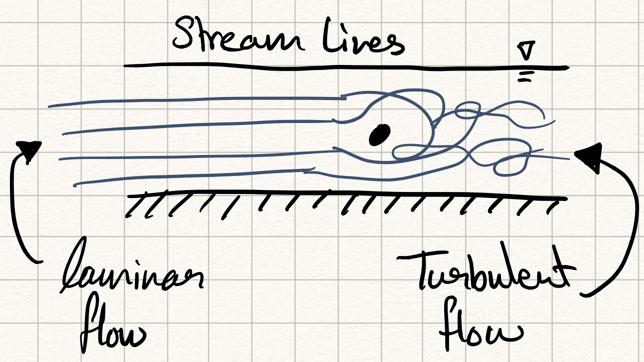
Open Chanel flow

WW

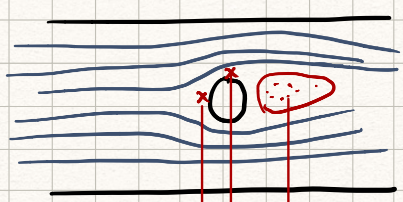


How to discribe the flow?

1) Velocity
2) Pressure (depth)



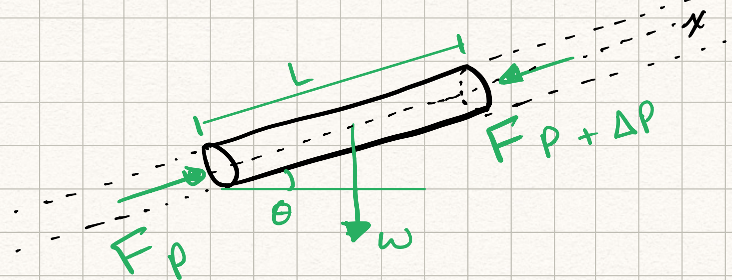
Top View



$V = \checkmark \implies a = ?$

$\Sigma F = ma$

FBD/Part of a long pipe



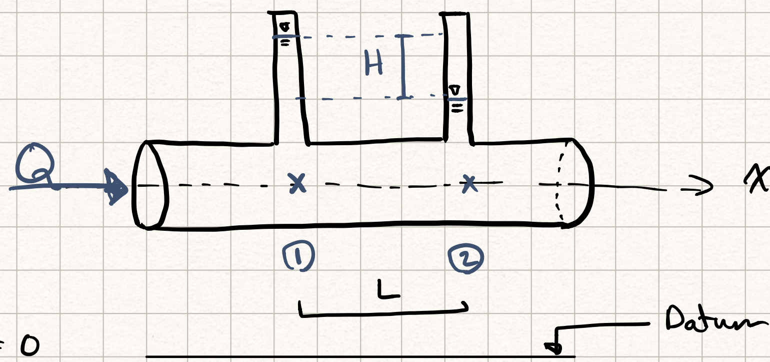
$$\Sigma F_x = ma_x \implies \cancel{PA} - (\cancel{P} - \Delta P)\cancel{A} - \overbrace{\gamma L \cancel{A}}^{w} \sin\theta = \underbrace{ma_x}_{\rho L \cancel{A}}$$

$$-\Delta P - \gamma L \frac{\Delta z}{L} = \rho L a_x$$

(next page →)

$$\boxed{-\frac{\partial}{\partial x}(P+\gamma z)=\rho a_x}$$

$$\Longrightarrow\ -\frac{\Delta P}{\Delta x}-\frac{\Delta z}{\Delta x}\gamma=\rho a_x$$



1. axis
2. Points of Intrest
3. ① ② P, x, z

$$①\begin{cases} P_1 \\ x_1=0 \\ z_1= \end{cases}$$

$$②\begin{cases} P_2 \\ x_2=L \\ z_2= \end{cases}$$

4. $\Delta P=P_2-P_1$
   $\Delta x=x_2-x_1$
   $\Delta z=z_2-z_1$

5. Use Euler's Equation

$$-\frac{\Delta P}{L}-\frac{\gamma\cancel{\Delta z}^{\,0}}{L}=\rho a_x$$

$$\left.\begin{array}{l} P_1=\gamma H_1 \\ P_2=\gamma H_2 \end{array}\right\} P_1-P_2=\gamma H$$

$$-\left(\frac{P_2-P_1}{L}\right)=\rho a_x$$

$$-\frac{(-H\gamma)}{L}=\rho a_x$$

$$a_x=\frac{H\gamma}{\rho L}$$