

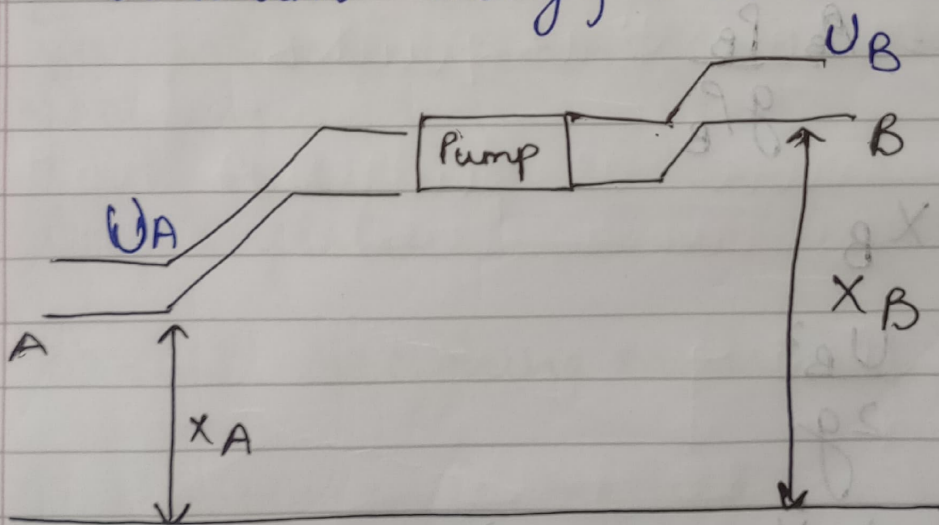
Bernoulli's Theorem

→ Law of conservation of Energy forms the principle of Bernoulli's Theorem.

power of pump
frictional losses
pressure changes } → application

Acc. to Bernoulli's Theorem

→ When a liquid (fluid) flows through a pipe under steady conditions (laminar flow) / ideal conditions ^(const temp) then the total energy contained in a fluid _{at any point} is equal to sum total of pressure energy, kinetic energy, datum energy (potential energy).



ideal means
const temp
steady
laminar

unit mass of volume | definite volume
at every point)

at any point energy ↓

$$= \text{Pressure energy} + \text{Datum energy} + \text{Kinetic energy}$$

$$\text{pressure} = \frac{P_A}{\rho_A}$$

(P = Pressure, ρ = acc. due to gravity)
 ρ_A = density

$$\text{Datum} = X_A \text{ (height)}$$

$$\text{Kinetic} = \frac{U_A^2}{2g} \text{ (} U_A = \text{velocity)}$$

$$T_A = \frac{P_A}{\rho_A} + X_A + \frac{U_A^2}{2g}$$

for point B

$$\text{pressure} = \frac{P_B}{\rho_B}$$

$$\text{datum} = X_B$$

$$\text{Kinetic} = \frac{U_B^2}{2g}$$

$$T = \frac{P_B}{\rho_B} + X_B + \frac{U_B^2}{2g}$$

$$T_A = T_B$$

$$\frac{P_A}{\rho_A} + X_A + \frac{U_A^2}{2g} = \frac{P_B}{\rho_B} + X_B + \frac{U_B^2}{2g}$$

+ W (work done by pump)

- F (frictional losses that occurs)

$$\frac{P_A}{\rho_A} + X_A + \frac{U_A^2}{2g} + W - F = \frac{P_B}{\rho_B} + X_B + \frac{U_B^2}{2g}$$

Flow Meters

→ Used to measure the rate of flow of liq.

→ To determine rate at which liq is flowing

→ Copper plates

- (a) Direct weighing method
 - (b) Hydrodynamic method
 - (c) Direct displacement method
- } Principles of flow meters

We will study hydrodynamic method (based on bernoulli's theorem)