BERNOULLI'S EQUATION FROM EULER'S EQUATION

Bernoulli's equation is obtained by integrating the euler's equation of motion

$$\frac{dp}{\rho} + g\,dz + v\,dv = 0$$ This is euler's eqn.

$$\int \frac{dp}{\rho} + \int g\,dz + \int v\,dv = 0$$

If flow is incompressible ρ = constant.

$$\frac{p}{\rho} + gz + \frac{v^2}{2} = \text{constant}$$

Dividing this eqn by g.

$$\frac{p}{g\rho} + \frac{v^2}{2g} + z = \text{constant}$$

$\frac{p}{g\rho}$ = Pressure head

$\frac{v^2}{2g}$ = Kinetic head

z = Potential head

Statement of Bernoulli's theorem →

It state that in a steady ideal fluid of an incompressible fluid, the total energy at any point of the fluid is always constant

∴ Total energy = constant

Pressure energy + Kinetic energy + Potential energy = constant

$$\frac{p}{\rho g} + \frac{v^2}{2g} + z = \text{constant}$$