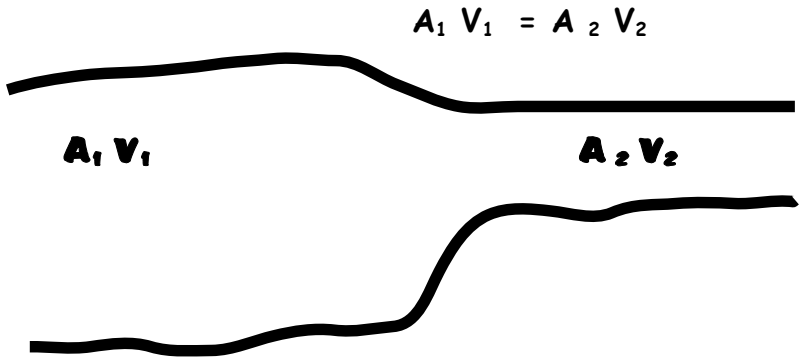
Dr. Alaa E. Kotp

Lect.5

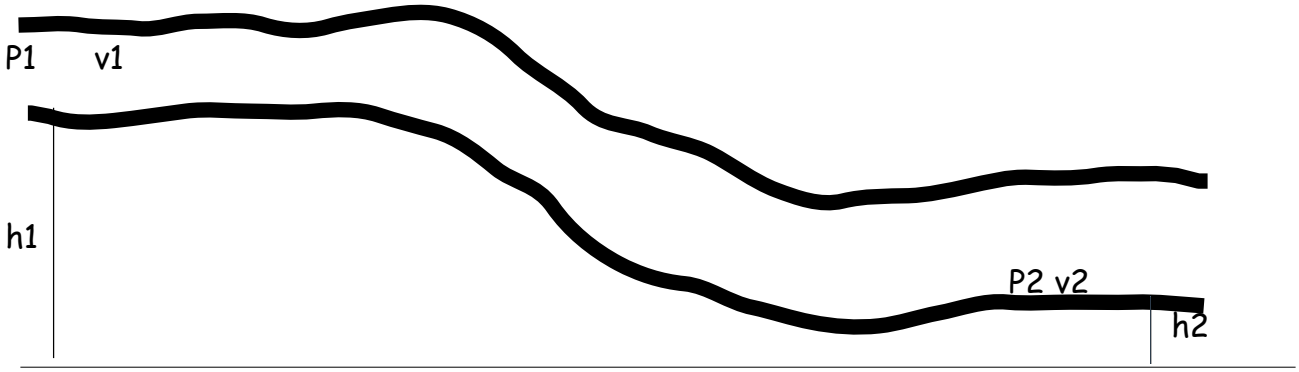
Fluid Dynamics

continuity equation:

the continuity equation for a fluid **is given by:**



Bernoulli's principle:



$K=\frac{1}{2}\rho(v_2^2-v_1^2)$ --------> Kinetic Energy

$W=P_1-P_2$ --------> Work

$U=\rho g(h_2-h_1)$ --------> Potential Energy

Work = kinetic energy + Potential energy

W = K + U

$P_1+1/2\,\rho v_1^2+\rho g h_1=P_2+1/2\,\rho v_2^2+\rho g h_2$ which is the Bernoulli's eq

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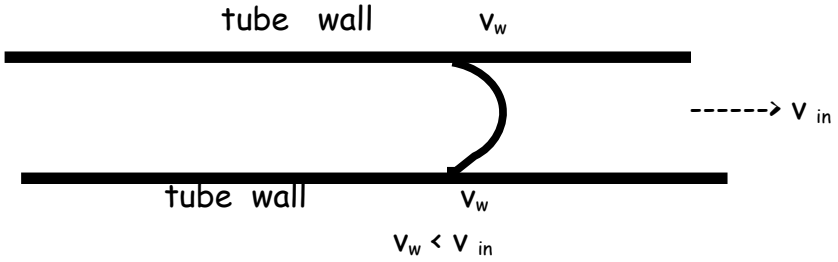
Special case:

when the tube is horizontal so $h_1 = h_2$

$$P_1 + 1/2\,\rho v_1^2 = P_2 + 1/2\,\rho v_2^2$$

Viscosity:

is the resistance of the fluid to flow



Speed of the liquid near the walls is less than the speed in the inner of the liquid.

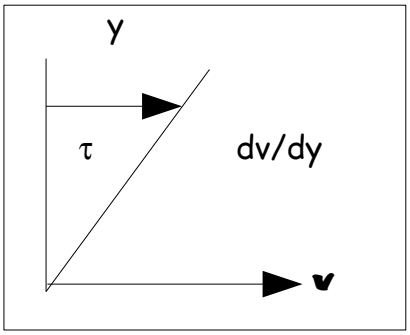
viscosity coefficient: η

the viscosity coefficient is give by:

$$\eta = \frac{\tau}{(\frac{dv}{dy})}$$

where, τ is the shear stress

dv/dy is the velocity gradient .



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