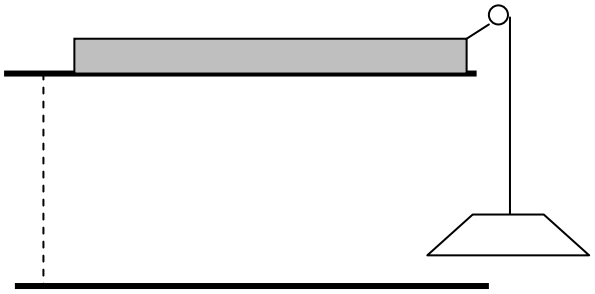
Properties of fluid :

Viscosity Dynamic viscosity	$\tau = \mu \frac{v}{y}$ for liner velocity variation	Unit	
		Force unit	$\frac{F * T}{L2}$
	$\tau = \mu \frac{dv}{dy}$ for non liner velocity variation	Mass unit	$\frac{M}{L * T}$
dynamic Viscosity	$v = \frac{\mu}{\rho}$	$\frac{L2}{L}$	

Example :

A Fluid is placed in the area between two parallel plate the upper plate is movable and connected to weight by a cable as show in finger calculator the velocity of the plate of the plate for tow case . M = 0.002 kg , y = 5 mm , g= 9.81 m/s2 , A = 0.5 m2



a- The fluid is glycerin (M= 0.95 $\frac{N.s}{m2}$)

b- The fluid is water (M= 0.0089 $\frac{N.s}{m2}$)

Solution :-

$w = M.g$

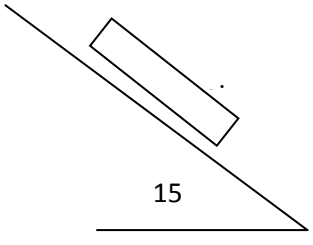
0.002 * 9.81 =

$\tau = \mu * \frac{v}{y}$

$\tau = \frac{F}{A} \quad = \quad \tau = \frac{F}{0.5}$

$\tau = \mu * \frac{v}{y} \quad = \quad \tau = \frac{F}{0.5} \quad = 0.95 * \frac{v}{0.005}$

An 18 kg slab slider show a 15° in clinked plain on 3- mm think film of oil at 20 C (μ = 8.14 E - 2 N.S/m2) contact area is 0.3 m2 find the terminal velocity of the slab ?



Solution :

A = 0.3 m^2

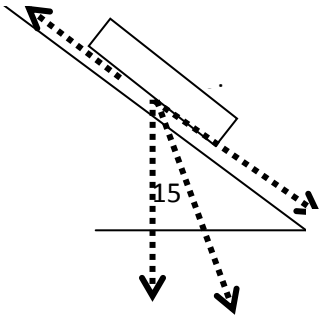
$\tau = M * \frac{v}{y}$

sum F = w sin 15 - τA

w sin 15 = τA

18 * 9.81 sin 15 = $8.14E-2 * \frac{v}{0.003} * 0.3$

V = 5.61 m/s



$v = 0.3\,y - y2$

V= velocity in m/s

M= 0.88

Y= distant " mater " from the plate

Determent the share stress at Y= 0 and Y = 0.1

Solution :

$\tau = \mu * \frac{dv}{dy}$

At Y= 0

$\frac{dv}{dy} = 0.3 - 2\,y = \tau = 0.88 * \left(0.3(0) - 2(0)\right) = \tau = 0.264\ \frac{N}{m2}$

At Y = 0.1

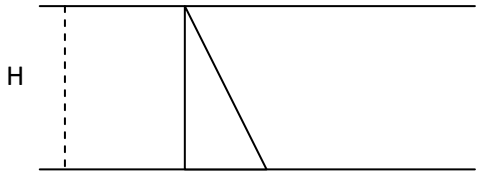
$\frac{dv}{dy} = 0.3 - 2\,y = \tau = 0.88 * \left(0.3(0.1) - 2(0.1)\right) = \tau = 0.088\ \frac{N}{m2}$

Pressure:

$p = \gamma * h$

unit :

N/m2 , ib/ft2

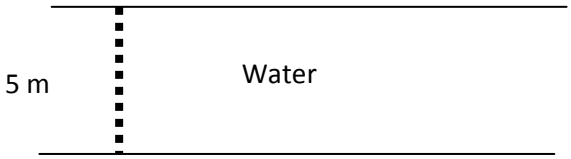


Example :-

p = ϒ*h

p = 5 * 9.81

p = 49.03 KN/m2



P1 = 0

$p2 = \gamma * h$

$p2 = 0.8 * 9.81 * 0.9 \quad =$

$p = 0 + \gamma * h + \gamma w * hw$

$p = 0 + 0.8 * 9.81 * 0.9 + (9.81 * 2.1)$