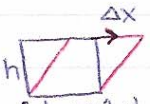
Class Notes – Lecture 26 (Biswas) 17 November 2009

Solids: Young's, Bulk, Shear moduli
Liquids/Gases: only Bulk modulus

Shear: 

Pressure

$P \equiv F/A$ in $Pa = N/m^2$

It's harder to push a blunt pin because A is larger

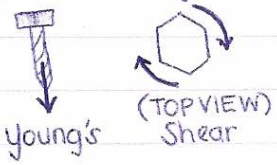
To decrease pressure, mattress companies increase A

Shear Modulus

$\underbrace{\frac{F}{A}}_{\text{shear stress}} = S \underbrace{\frac{\Delta x}{h}}_{\text{shear strain}}$ **OR** $S = \frac{F/A}{\Delta x/h}$

Like applying a torque (Young's = applies a force)

On a bolt:



Bulk Modulus

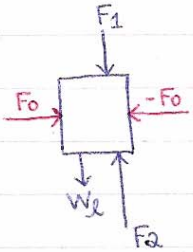
$\Delta P = -B\left(\frac{\Delta V}{V}\right)$

DEMO: 
P increases
V decreases

DEMO: 

P exerts a perpendicular force

Pressure and Depth

Darker ℓ segment: 

$F_2 - F_1 - mg = 0$

$F_2 = P_2A$ $(M = \rho V)$

$P_2A - P_1A - Mg = 0$

$V_{cylinder} = \pi r^2 h$

$\rho Ah = M$

$\therefore P_2A - P_1A - \rho Ahg = 0$

$P_2 = P_1 + \rho gh$

DEMO: 

$P_{top} = 1\,atm$
As h increases, P increases