ELASTICITY

Stress	$\text{Stress} = \frac{\text{Restoring force}}{\text{Area}}$
Strain	$\text{strain} = \frac{\text{Change in configuration}}{\text{Original configuration}}$
Volumetric Stress	$\Delta P = -K\frac{\Delta V}{V}$
Tangential/Shear Stress	$\frac{F}{A} = \eta\theta$
Hook's Law	$\text{Stress} \propto \text{Strain}$ $\text{Stress} = \varepsilon \times \text{Strain}$

Modulus of Elasticity

Young's modulus	$Y = \frac{\text{Normal Stress}}{\text{Longitudnal Strain}}$	$Y = \frac{Fl}{A\Delta l}$
Bulk modulus	$K = \frac{\text{Volumetric Stress}}{\text{Volumetric Strain}}$	$K = \frac{\Delta pV}{\Delta V}$
Modulus of Rigidity	$\eta = \frac{\text{Tangential Stress}}{\text{Shearing Strain}}$	$\eta = \frac{Fl}{A\theta}$
Relation b/w σ, K, η, λ	$Y = 2\eta(1+\sigma) = 3K(1-2\sigma)$	
Velocity of longitudinal wave in rod	$v = \sqrt{\frac{Y}{\rho}}$	

Bulk modulus for diff. thermodynamics process

Isobaric	Isochoric	Isothermal	Adiabatic
$K = 0$ $P = \text{const.}$	$K = \infty$ $V = \text{const.}$	$K = P$ $T = \text{const.}$	$K = \gamma P$ Adiabatic exponent

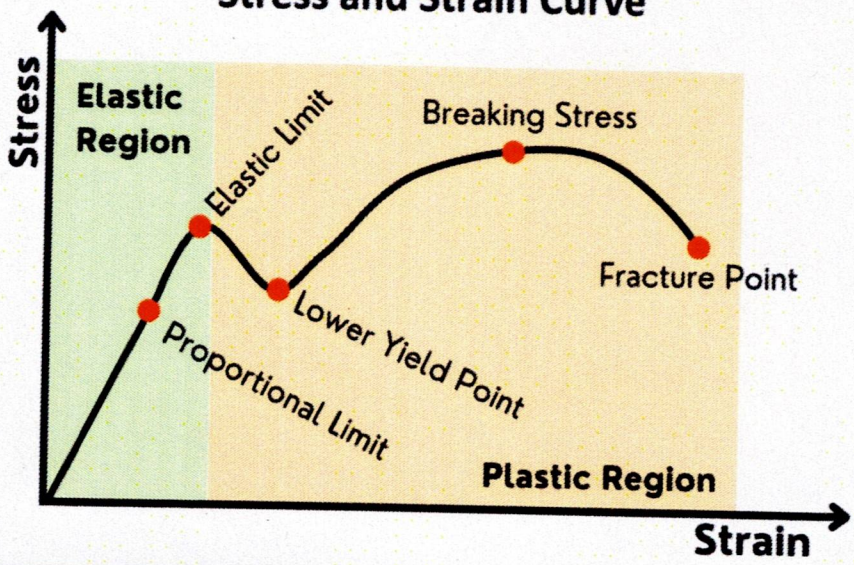
Energy

Elastic Potential Energy	$U = \frac{1}{2}(\text{stress})(\text{strain})(\text{volume})$

Energy stored per unit volume

$\frac{1}{2}\text{stress} \times \text{strain}$	$\frac{1}{2}\frac{(\text{Stress})^2}{\gamma}$	$\frac{1}{2}(\text{strain})^2\gamma$

Stress and Strain Curve



Poisson's Ratio(σ)	$\sigma = \frac{\text{Lateral strain}}{\text{Longitudnal strain}} = \frac{-\Delta R/R}{\Delta l/l}$