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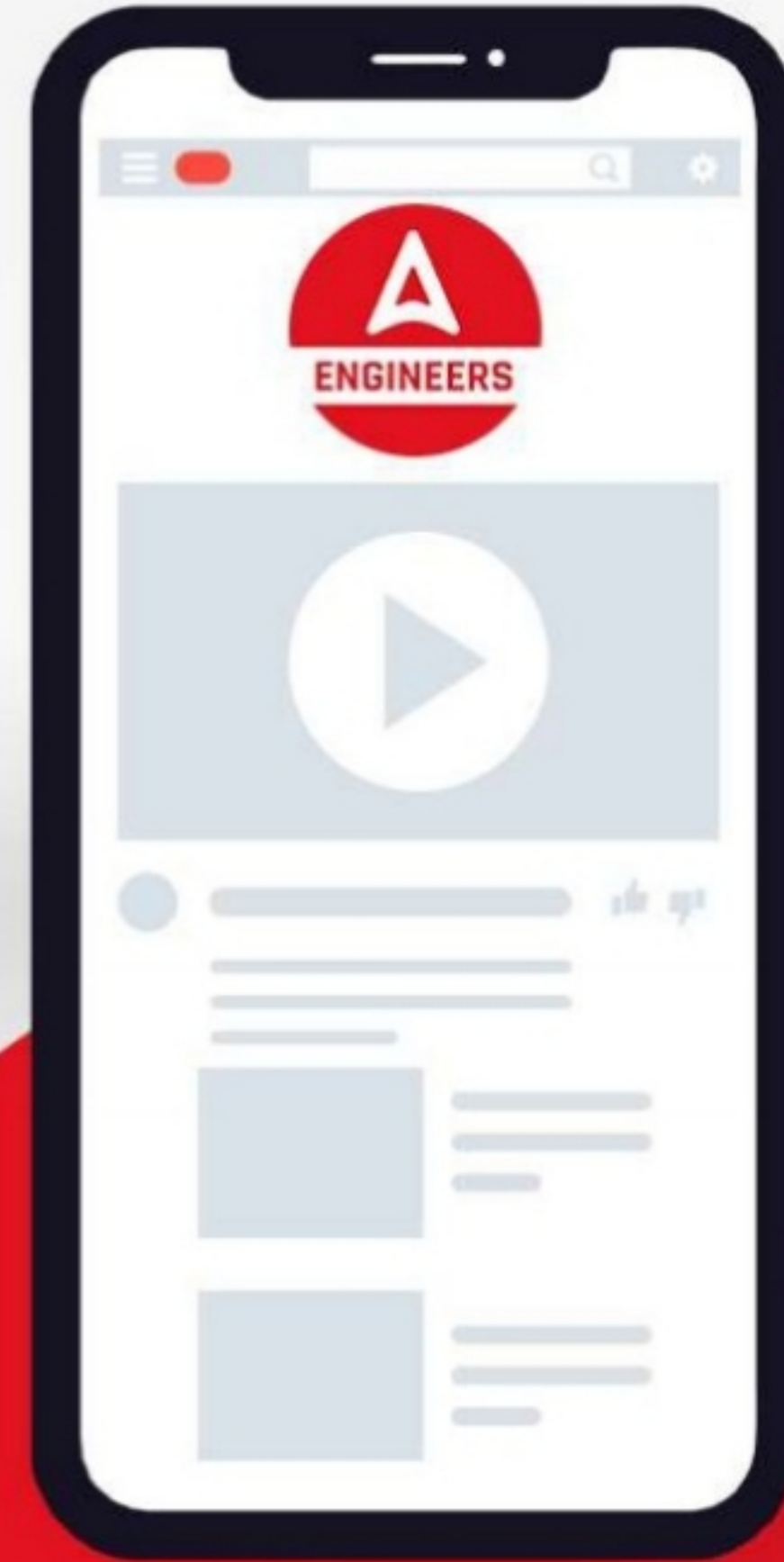
Power Capsule



Notes & Articles



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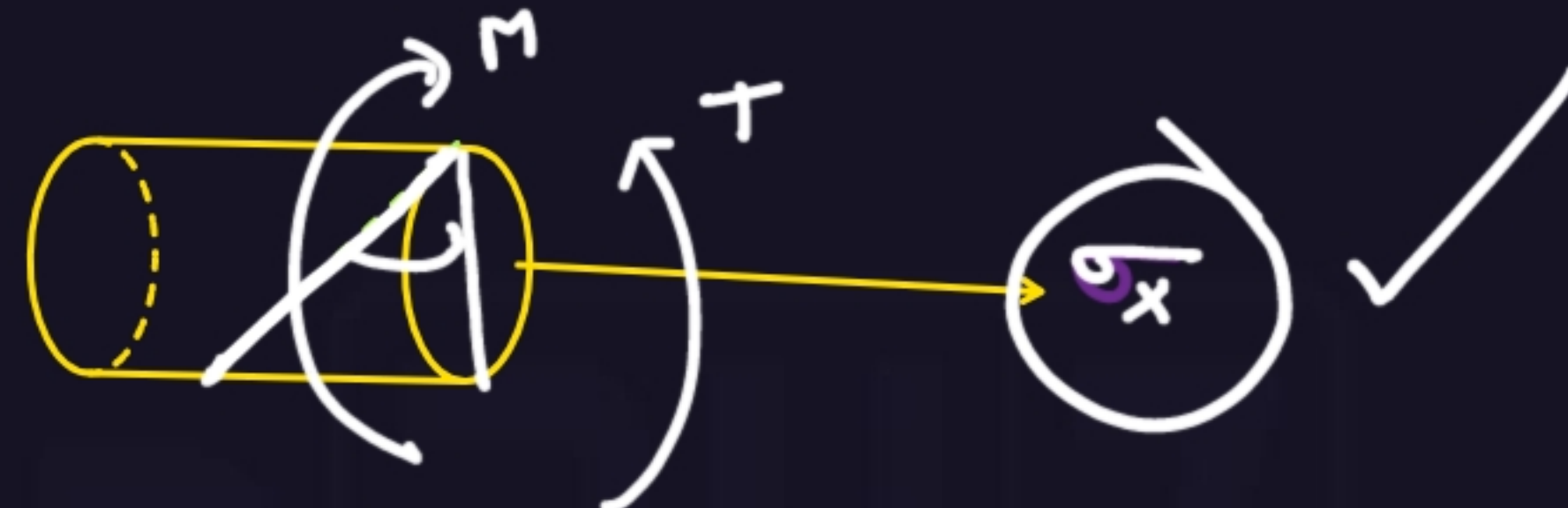
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Combined stress

Real life → M/c structure

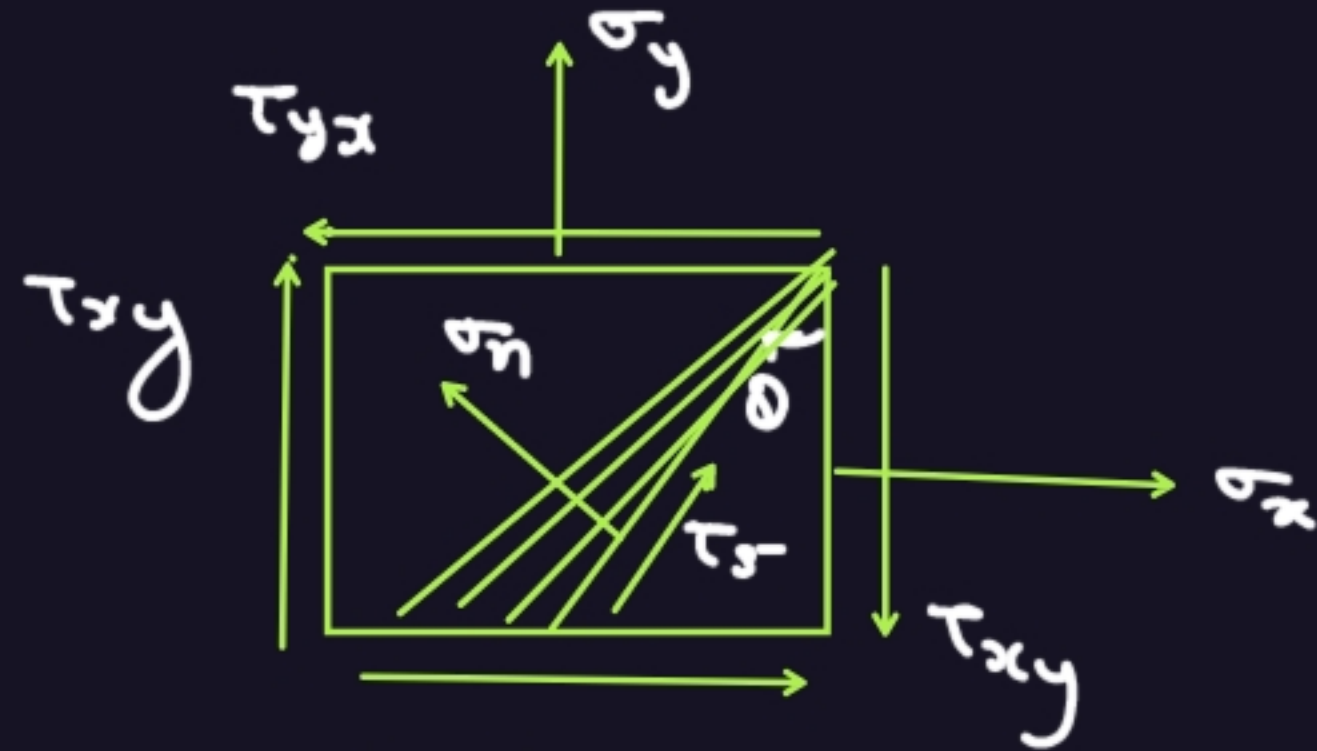


(\sigma)_{max} = ?
(\tau)_{max} = ?

कहाँ होगा

$\tau_{eq} = ?$ ✓
 $\sigma_{eq} = ?$ ✓

Bi axial state stress



σ_x
 σ_y \oplus

$\tau_{xy} + \frac{c.w}{2}$

$\theta \rightarrow x$ face $\frac{(c.w)}{2} \theta \rightarrow$

$$\sigma_{11} = \frac{(\sigma_x + \sigma_y)}{2} + \frac{(\sigma_x - \sigma_y)}{2} \cos 2\theta + \tau_{xy} \sin 2\theta$$

$\theta \rightarrow$ infinit
 $\sigma_{11} \rightarrow$



O.P & C.O.B \perp
C.O.P angle from
x face $90 + \theta$

$$\sigma_{11}' = \frac{(\sigma_x + \sigma_y)}{2} + \frac{(\sigma_x - \sigma_y)}{2} \cos 2(90 + \theta) + \tau_{xy} \sin 2(90 + \theta)$$

$$\sigma_n + \sigma_n' = \sigma_x + \sigma_y \rightarrow \underline{\text{vvi mp!}}$$

$$\text{O.P} \rightarrow \tau_s = - \frac{(\sigma_x + \sigma_y)}{2} \sin 2\theta + \tau_{xy} \cos 2\theta$$

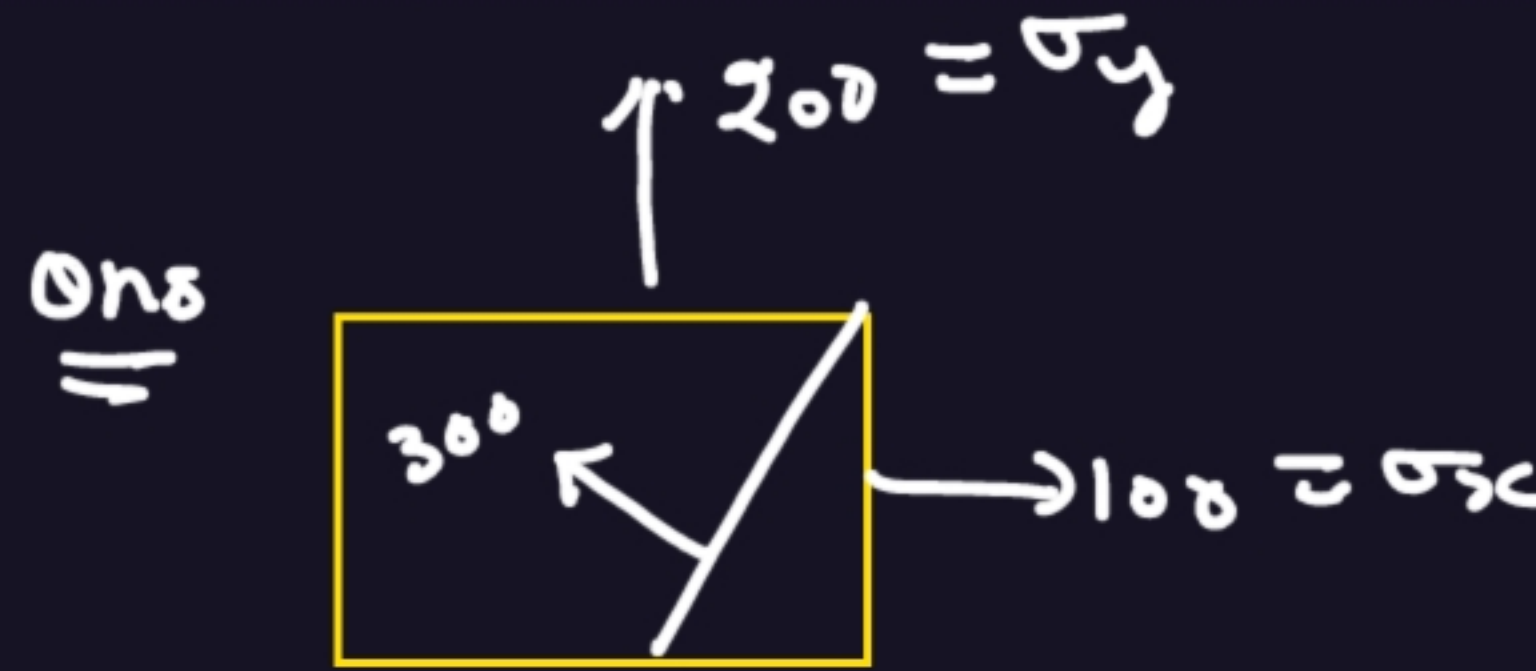
$$\text{C.O.P} \rightarrow \tau_s' = \frac{(\sigma_x + \sigma_y)}{2} \sin 2\theta$$

$$\tau_s' = ? - \frac{(\sigma_x + \sigma_y)}{2} \sin 2(90 + \theta) + \tau_{xy} \cos 2(90 + \theta)$$

$$\underline{\tau_s + \tau_s' = 0}$$

$$\tau_s = -\tau_s'$$

Complimentary Shear stress



- (A) 100
- (B) 200
- (C) 300
- (d) None

$\sigma_{n'} = 0$

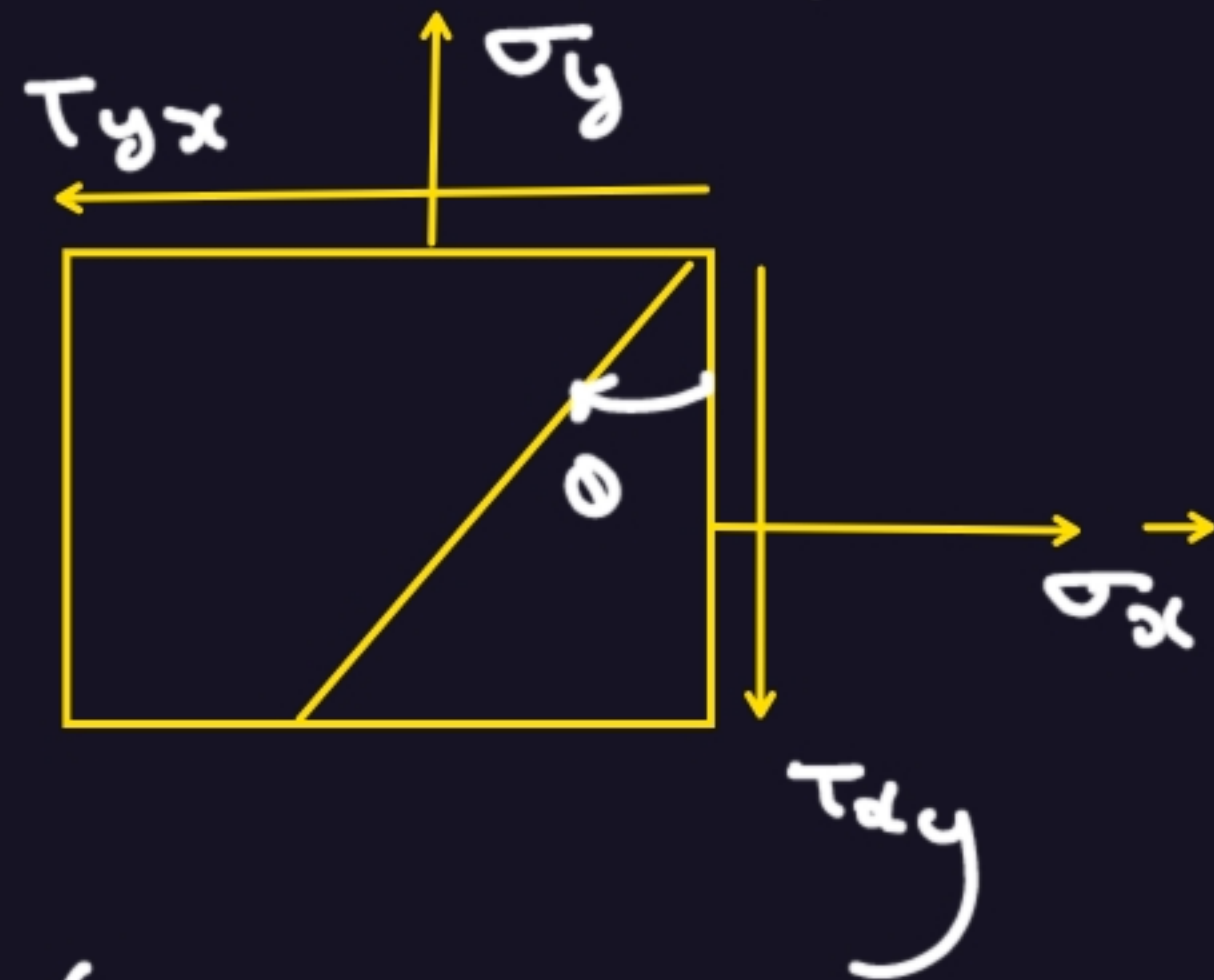
(10) Sec

$$\sigma_n + \sigma_{n'} = \sigma_x + \sigma_y$$

$$300 + \sigma_{n'} = 300$$

$$\sigma_{n'} = 0$$

Principal stress and Plane



$(\sigma_n \text{ and } \tau_s)$ infinitesimal value
 $\theta \rightarrow$ infinitesimal

$(\sigma_n)_{max} \rightarrow \sigma_1 = \text{M.P.S (By magnitude)} \rightarrow$ corresponding angle θ_1

$(\sigma_n)_{min} \rightarrow \sigma_2 \rightarrow \underline{\underline{\text{Min. P.S}}} \rightarrow \theta_2$
 OR

Principal Plane $\rightarrow (\sigma_n)_{max/min}$ or $\underline{\underline{\tau_s = 0}}$
 Plane of Zero Shear

Principal Plane

$$\underline{\underline{\tau_s = 0}} = -\left(\frac{\sigma_x - \sigma_y}{2}\right) \sin 2\theta + \tau_{xy} \cos 2\theta$$

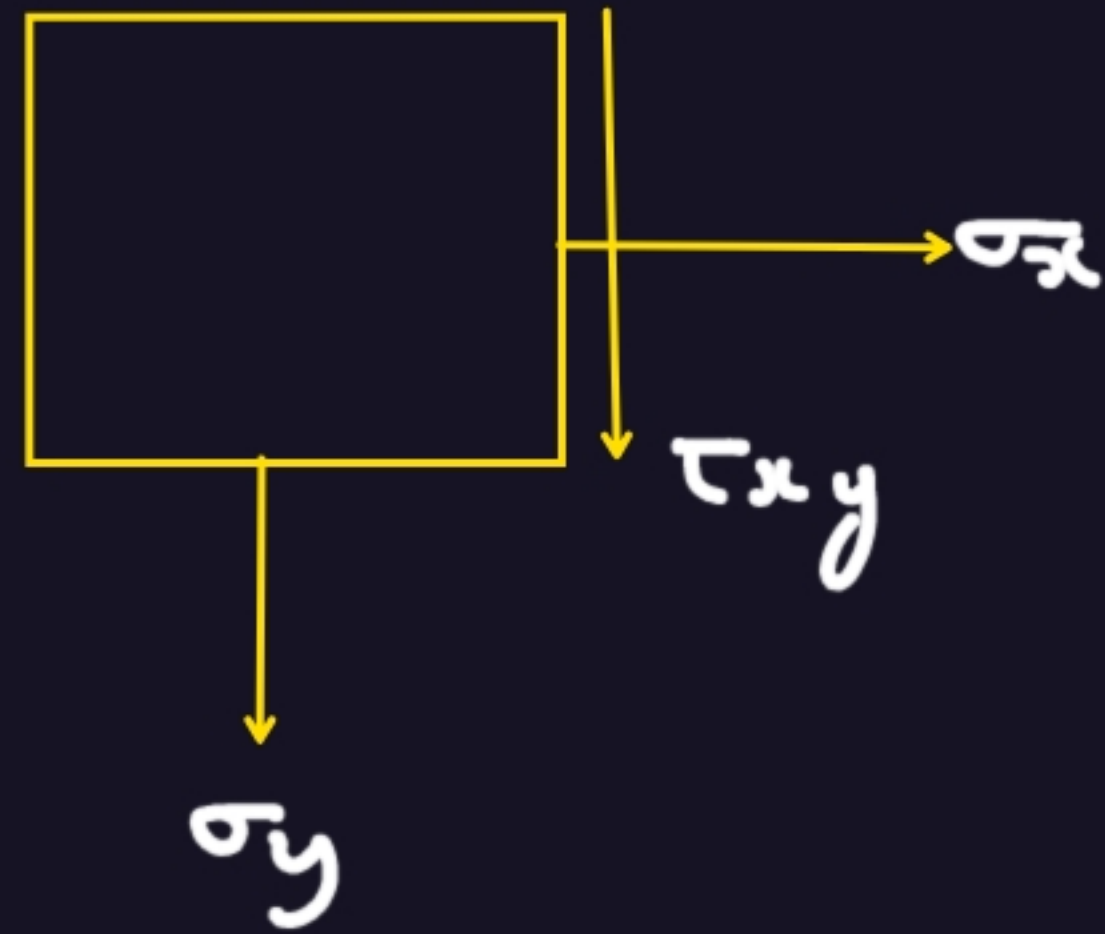
$$\left(\frac{\sigma_x - \sigma_y}{2}\right) \sin 2\theta = \tau_{xy} \cos 2\theta$$

$$\tan 2\theta = \frac{2\tau_{xy}}{\sigma_x - \sigma_y}$$

θ_1, θ_2 values

$$\left(\sigma_n\right)_{\theta=\theta_1} = \left(\sigma_n\right)_{\max} \rightarrow \sigma_1$$

$$\left(\sigma_n\right)_{\theta=\theta_2} = \left(\sigma_n\right)_{\min} \rightarrow \sigma_2$$



$$\sigma_1, \sigma_2 = \frac{\sigma_x + \sigma_y}{2} \pm \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2}$$

$(\sigma_1)_{max} \rightarrow$ M.P.S

$(\sigma_2)_{min} \rightarrow$ Minor P.S

Maximum sheay stress

$$\tau_s = \frac{d\tau_s}{d\theta} = 0$$

$$\left. \begin{matrix} \sigma_3 \\ \sigma_4 \end{matrix} \right) \rightarrow: \underline{\underline{(\tau_s)}}$$

$$\tau_{max} = \frac{\sigma_1 - \sigma_2}{2} = \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2}$$

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THANKS FOR

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