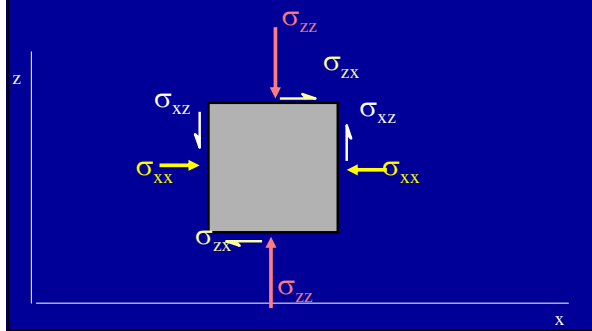


Dynamic Analysis Stress 2

Outline

- Review
- Principal Stress Components
- Stress Ellipse
- General Stress Equations
- Mohr Circle of Stress
- Examples
- 3D Mohr Circles
- States of Stress

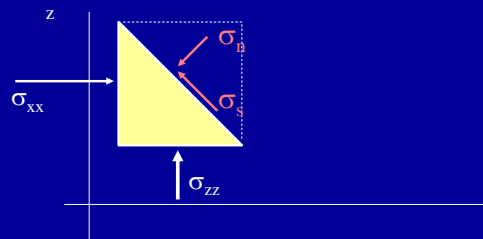
Stress Components



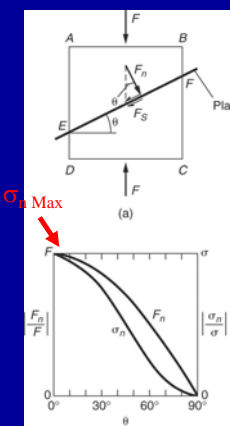
Resolving stress on a plane

Given σ_{xx} and σ_{zz}

What are σ_n and σ_s acting on given plane?

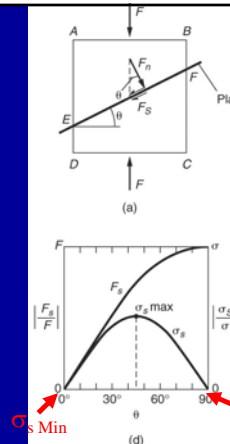


Magnitude of
Normal Stress
As a function of
Angle θ

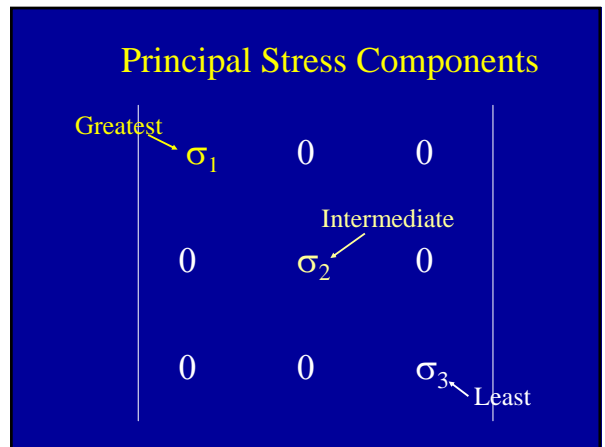
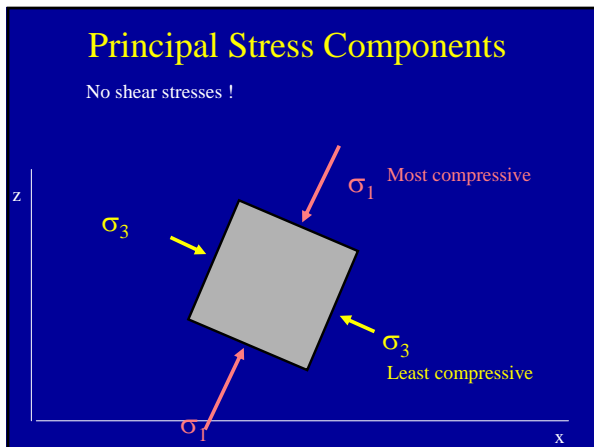
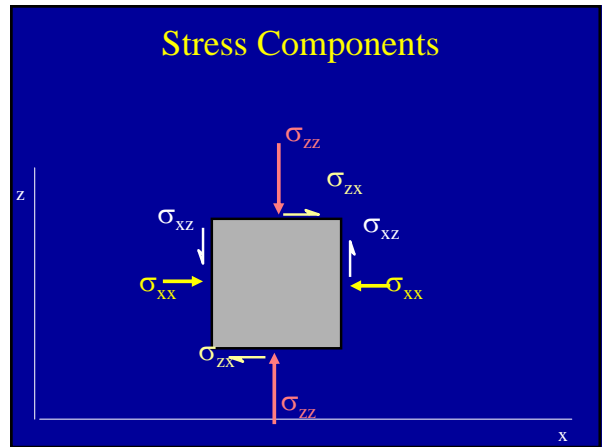
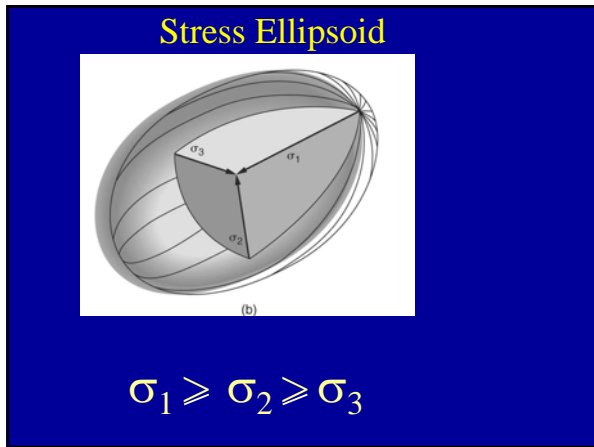
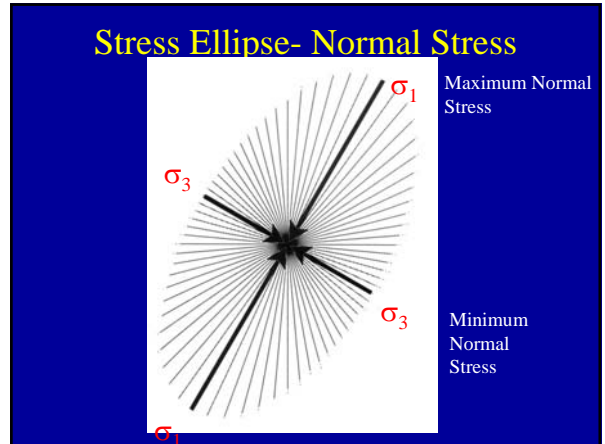
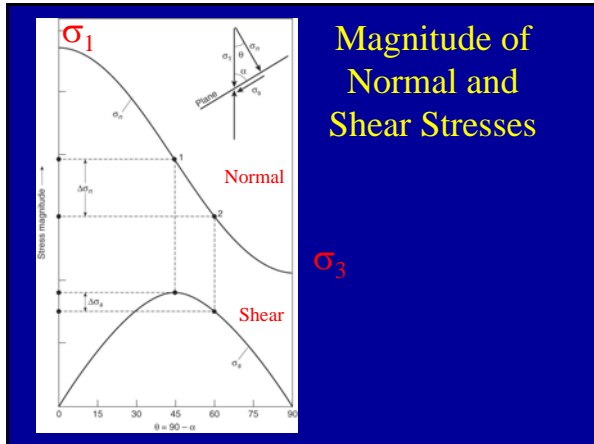


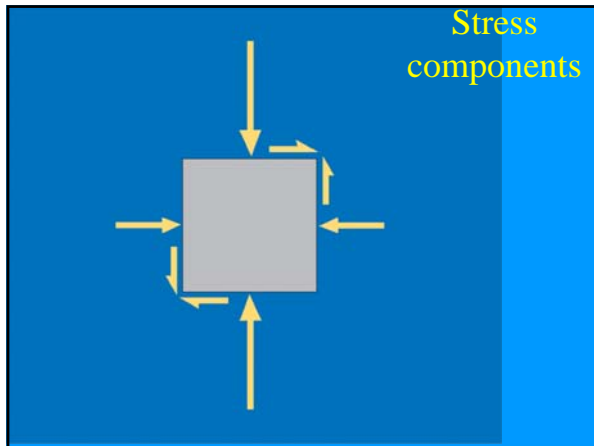
$$\sigma_n = \sigma \cos^2 \theta$$

Magnitude of
Shear Stress
As a function of
Angle θ



$$\sigma_s = \sigma \frac{1}{2} \sin 2\theta$$



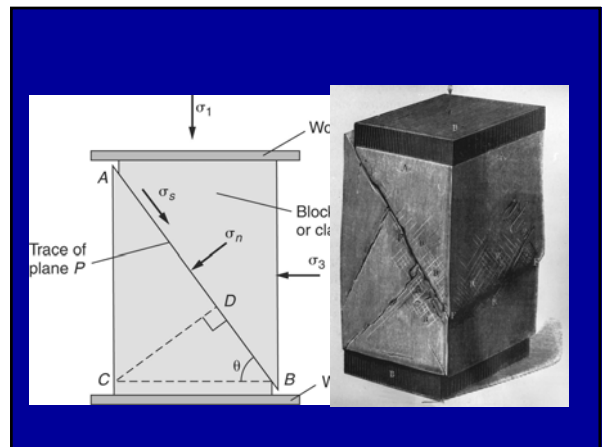
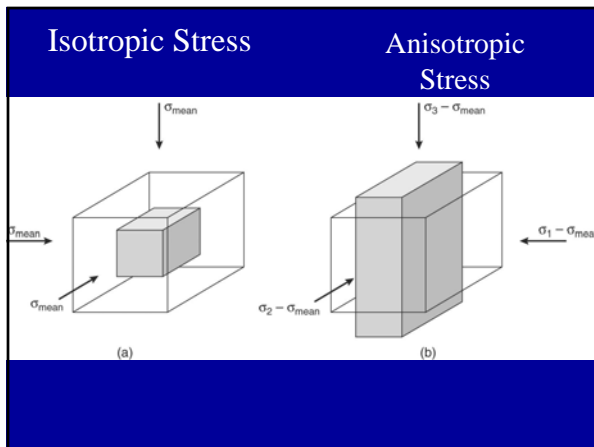
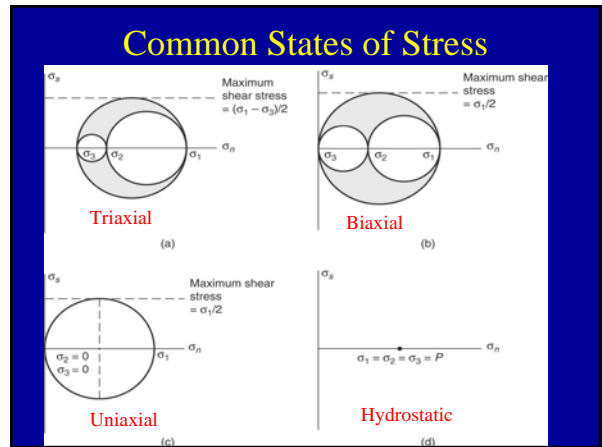
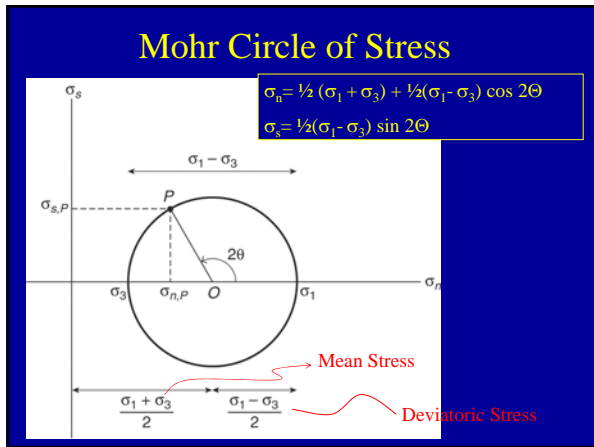


General Stress Equations

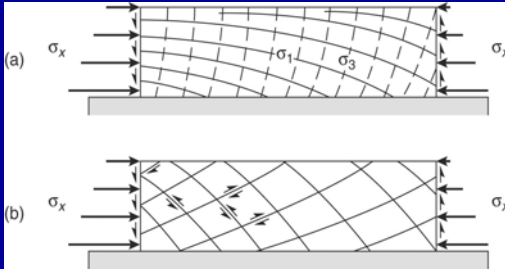
$$\sigma_n = \frac{1}{2}(\sigma_1 + \sigma_3) + \frac{1}{2}(\sigma_1 - \sigma_3) \cos 2\Theta \quad (\text{eq. 3.7})$$

$$\sigma_s = \frac{1}{2}(\sigma_1 - \sigma_3) \sin 2\Theta \quad (\text{eq. 3.10})$$

$\Theta =$ angle between plane and σ_3
 or between normal to the plane and σ_1
 + counterclockwise, - clockwise



Stress Trajectories



World Stress Map

