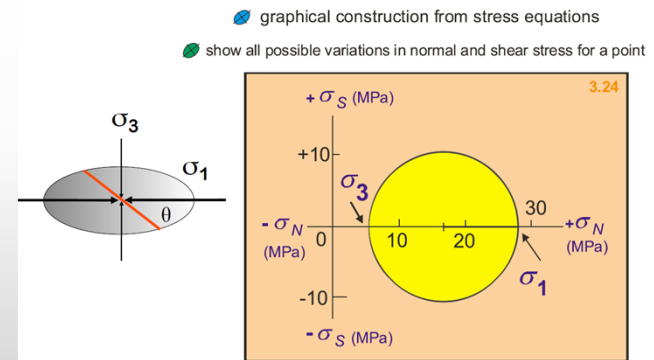


Lecture 05, OPTIONAL slides reviewing Mohr circles.

- These could be converted to “real” slides.
- They are provided as an alternative way of conveying Mohr circle construction and use.

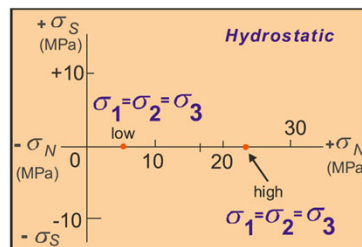
Mohr circle stress diagram



“Imaging” stress: hydrostatic

hydrostatic stress - all normal stresses equal, zero shear stress

Mohr diagram: single point on σ_N axis

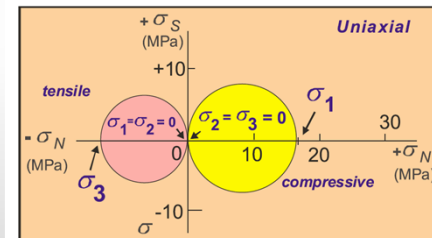


stress ellipse = circle
stress ellipsoid = spherical

“Imaging” stress: Uniaxial

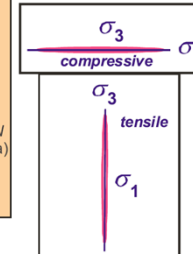
uniaxial stress - two of three principal stresses are zero

Mohr diagram: circle that passes through the origin
(right side if compressive; left side if tensile)



stress ellipse = needle

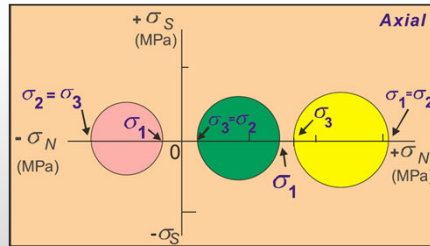
stress ellipsoid = needle



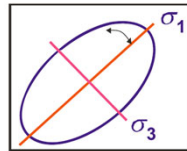
“Imaging” stress: axial stress

axial stress - all 3 principal stresses non-zero, but two are equal magnitude

Mohr diagram: circle not through the origin



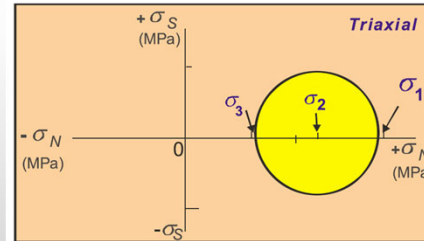
stress ellipsoid = ellipse
stress ellipsoid = flattened
oblate spheroid to
prolate spheroid



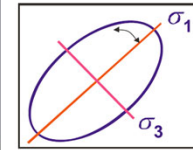
“Imaging” stress: triaxial

triaxial stress- general case where principal stresses are non-zero and not equal
may be all compressive, all tensile, or any combination

Mohr diagram: circle not through the origin

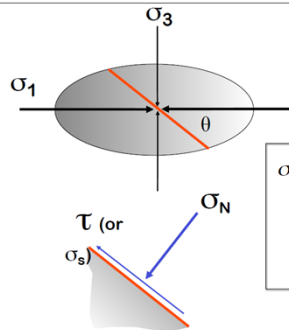


stress ellipsoid = ellipse
stress ellipsoid = ellipsoid



2D stress – fundamental equations

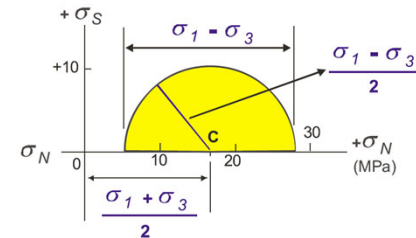
If known principal stresses (orientation & magnitude)
Can calculate σ_n & σ_s for any plane



$$\sigma_n = \frac{1}{2}(\sigma_1 + \sigma_3) + \frac{1}{2}(\sigma_1 - \sigma_3)\cos 2\theta$$

$$\sigma_s = \frac{1}{2}(\sigma_1 - \sigma_3)\sin 2\theta$$

Making the Mohr circle

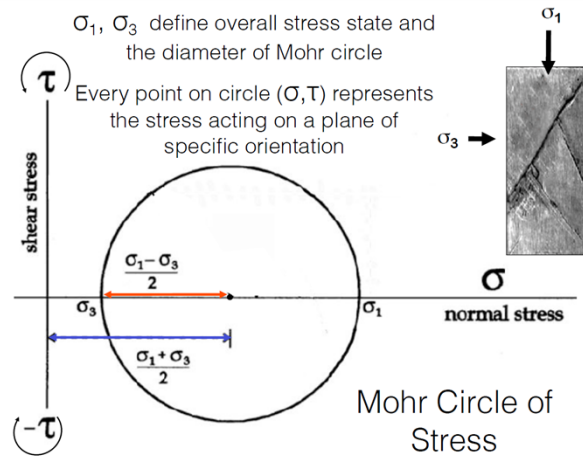


centre of circle = point of mean stress:
hydrostatic component of stress - tends to produce dilation strain

radius of circle = deviatoric stress
nonhydrostatic component of stress - tends to produce distortion strain

diameter of circle = differential stress
greater values = greater potential for distortion strain

What do Mohr circles reveal?



What do Mohr circles reveal?

