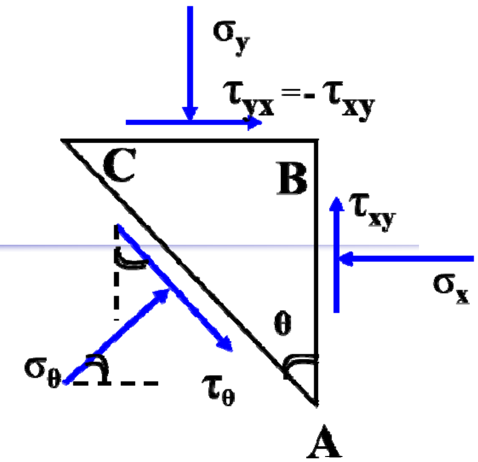
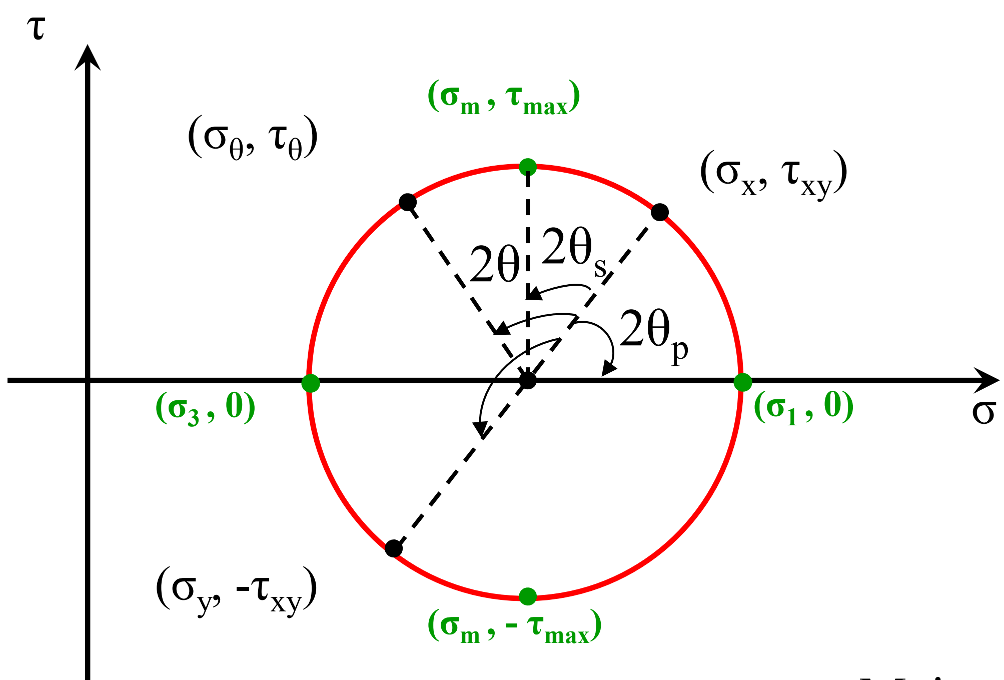
MOHR'S CIRCLE OF STRESS

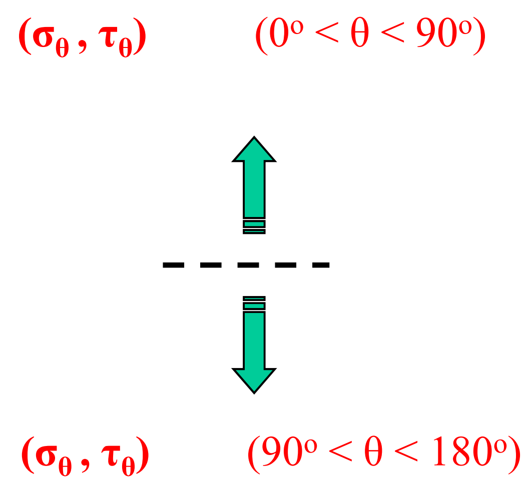
Graphical representation of stress state on a point/plane.



Equation of Mohr's Stress Circle

$$[\sigma - 0.5(\sigma_x + \sigma_y)]^2 + \tau^2 = [0.5(\sigma_x - \sigma_y)]^2 + \tau^2_{xy}$$



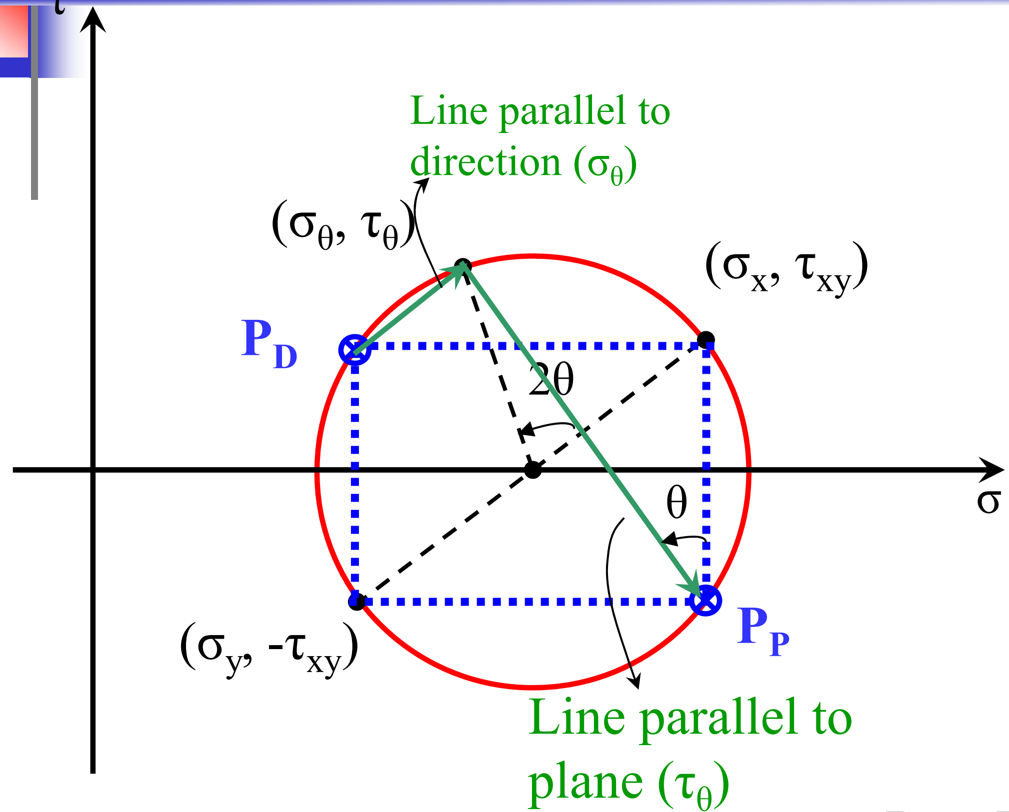


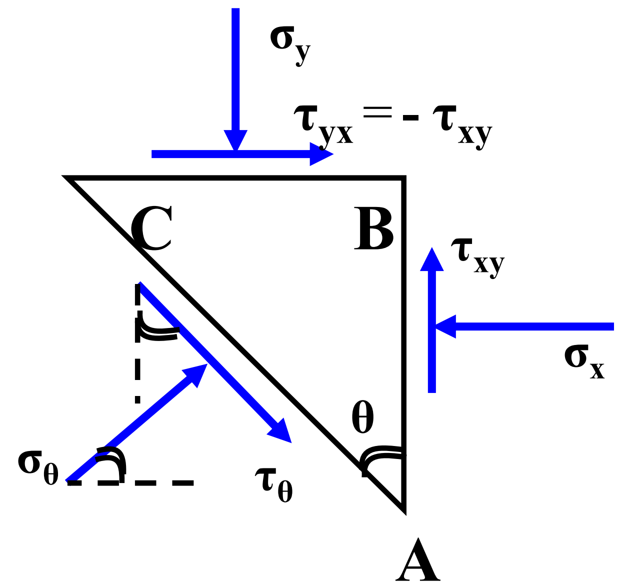
$C = 0.5(\sigma_1+\sigma_3)$, $R = \sqrt{[\{0.5(\sigma_1-\sigma_3)\}^2 + (\tau_{xy})^2]}$

$\sigma_1 = C+R$, $\sigma_3 = C-R$, $\tau_{max} = R$

Major principal stress: σ_1
Minor principal stress: σ_3
Mean principal stress: σ_m
Maximum shear stress: τ_{max}

Location of Poles on Mohr's Circle





Pole with respect to direction: ***P_D***
Pole with respect to plane: ***P_P***

2θ: Central angle
θ: Circumferential angle

P_P = Point on Mohr circle such that any line drawn thru **P_P** parallel to the plane of interest will intersect circle at the stresses on that plane.

Exercise-1: Obtain the direction of σ_1, σ_3, and τ_{max}. Also prove that the angle between maximum shear stress plane and principal stress plane is always 45°.