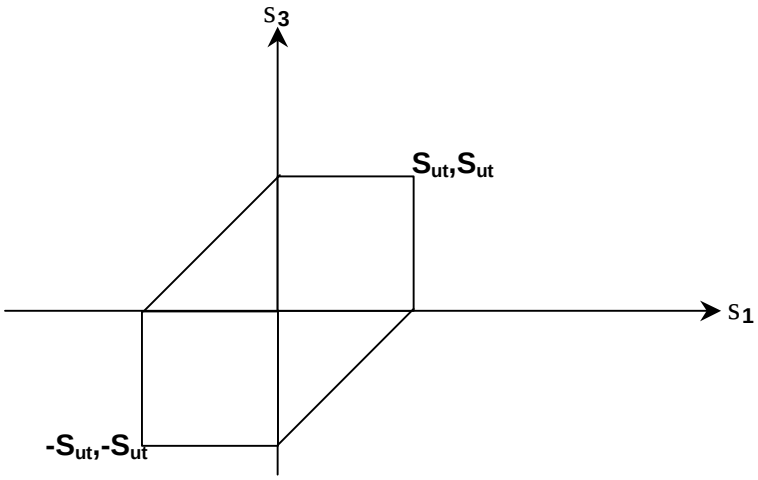
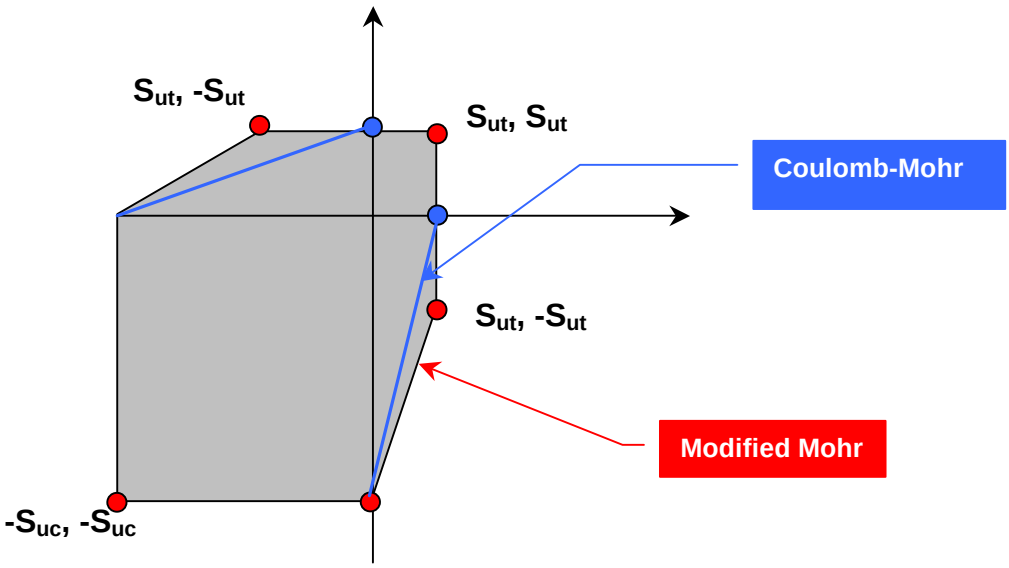
Maximum Shearing Stress Theory:

Failure will occur when the maximum shear stress exceeds ½ of the materials yield strength

$$\tau_{max} \geq \frac{1}{2} S_y$$



Modified Mohr Effective Stress--Brittle Materials



$$C_1 = \frac{1}{2}\left[\left|s_1 - s_2\right| + \frac{-\left|S_{uc}\right| + 2S_{ut}}{-\left|S_{uc}\right|}\left(s_1 + s_2\right)\right]$$

$$C_2 = \frac{1}{2}\left[\left|s_2 - s_3\right| + \frac{-\left|S_{uc}\right| + 2S_{ut}}{-\left|S_{uc}\right|}\left(s_2 + s_3\right)\right]$$

$$C_3 = \frac{1}{2}\left[\left|s_3 - s_1\right| + \frac{-\left|S_{uc}\right| + 2S_{ut}}{-\left|S_{uc}\right|}\left(s_1 + s_3\right)\right]$$

$$\tilde{s} = MAX\left(C_1, C_2, C_3, s_1, s_2, s_3\right)$$

$$\tilde{s} = 0 \; if \;\; MAX < 0$$

If C_1, C_2, C_3, σ_1, σ_2, σ_3 are all negative, $\tilde{s}$ is 0

In class exercises:

For an <u>even</u> material (i.e., $S_{uc} = S_{ut}$)
Draw the Mohr's circles that represent the uni-axial tension and compression tests for a test specimen. Locate the maximum shear stress on your circles.

For an <u>uneven</u> material (i.e., $S_{uc} >> S_{ut}$)
Draw the Mohr's circles that represent the uni-axial tension and compression tests for a test specimen. Locate the maximum shear stress on your circles.

Review the Mohr's circles carefully for both cases and determine whether or not you would recommend the Maximum Shear Stress Theory for ductile and/or brittle materials.