Coulomb-Mohr theory for ductile materials

Some ductile materials have significantly different tension + compression strengths. In this case, we use the Coulomb-Mohr theory of failure.

This theory predicts failure when

$$\frac{\sigma_1}{S_t} - \frac{\sigma_3}{S_c} \geq 1 ,$$

where S_t and S_c can be either yield or ultimate strengths.

With a factor of safety n, the equation is

$$\frac{\sigma_1}{S_t} - \frac{\sigma_3}{S_c} \geq \frac{1}{n} .$$

The same precautions apply here for plane stress. Recall that we must always check to see if 0 is not σ_1 or σ_3, instead of the plane stresses σ_A + σ_B.

As with the other ductile failure theories, C-M defines an envelope inside which it predicts the part will not fail. This is illustrated in the figure.