

Summary: general stresses in beams

- *General loading*: For a typical point on a beam cross-section there are two components of stress:

flexural stress:
$$\sigma = -\frac{My}{I}$$

shear stress:
$$\tau = \frac{VA^*\bar{y}^*}{It}$$

- *Stress distributions*: Each component varies over the height dimension y (measured from neutral plane):
 - The flexural stress σ varies linearly in y , with σ taking on a value of zero at the neutral axis and maximum magnitude values at the top and bottom surfaces. The top and bottom locations are of opposite signs (tension and compression).
 - The distribution of the shear stress τ depends on the shape of the cross-section. τ is zero at the top and bottom surfaces, always. The maximum magnitude of τ occurs at (or near) the neutral axis. The direction of τ is governed only by the direction of V .

