9th - Jan 2004

$\tau_m = ?$ $\tau_a = ?$

$$\tau_m = \left(\frac{16\,T_m}{\pi d^3}\right) K_f \qquad \tau_a = \left(\frac{16\,T_a}{\pi d^3}\right) K_f$$

need $K_t$ $\Rightarrow$ need $K_t$ & $q$

$K_t$ $r/d = 0.05$ $D/d = 1.2$

$K_t = 1.57$ from Handout.

$q$ depends on $r$, which we don't know

$\Rightarrow$ be conservative

just use $S_u$ to get $q$

$\Rightarrow q = 0.95$

$$K_f = 1 + (1.57 - 1)(0.95) \simeq 1.54$$

Subst into $\tau_m$ $\tau_a$

$$\tau_m \overset{\text{F.S.}}{=} 2\left[\frac{16\,(1000)}{\pi d^3}\right]_{1.54}^{K_f} = \frac{15685}{d^3}$$

$$\tau_a = 2\left[\frac{16\,(250)}{\pi d^3}\right]_{K_f}^{1.54} = \frac{3922}{d^3}$$

$$\boxed{\frac{\tau_a}{\tau_m} = 0.25 \text{ approx.}}$$ ← load line