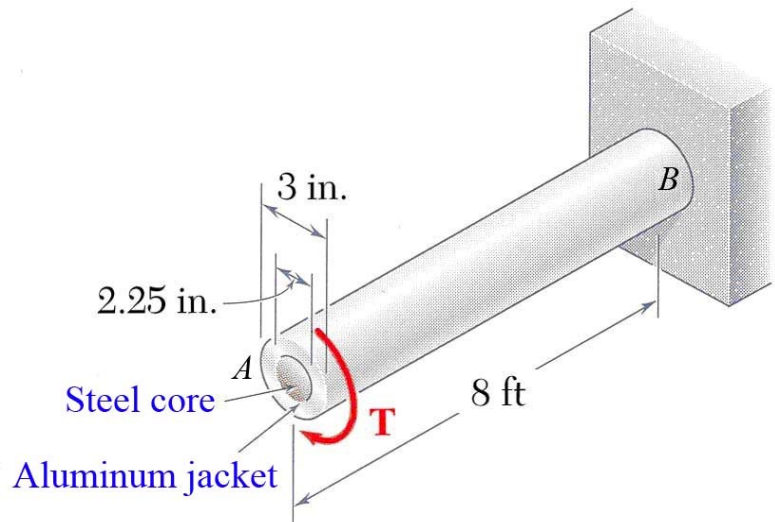


MEEG 3013 Quiz #3

A 50-kip·in. torque \mathbf{T} is applied at end A of the composite shaft shown, where $G_s = 11.2 \times 10^6$ psi for steel and $G_a = 3.9 \times 10^6$ psi for aluminum. Determine (a) $(\tau_{\max})_s$ in the steel, (b) $(\tau_{\max})_a$ in the aluminum, (c) the angle of twist ϕ_A (in degrees) of the composite shaft at A.



Using kips and inches:

$$T_s + T_a = 50 \quad (2)$$

$$\phi = \frac{T_s L}{J_s G_s} = \frac{T_a L}{J_a G_a} \quad (2)$$

$$(T_s = 1.329230769 T_a)$$

(a) $(\tau_{\max})_s = 12.76$ ksi (2)

(b) $(\tau_{\max})_a = 5.92$ ksi (2)

(c) $\phi_A = 5.57^\circ$ (2)