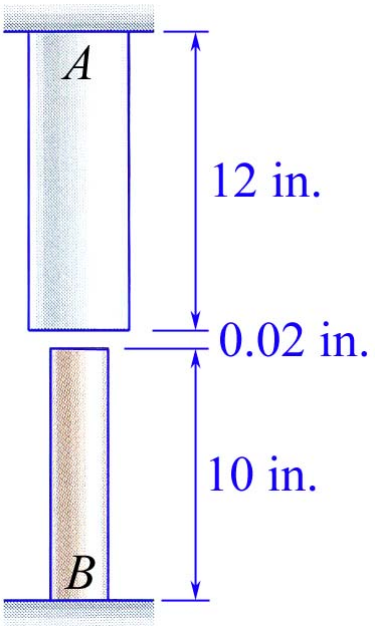
MEEG 3013 Quiz #2.m06.082

1. Including a sketch, define the *stress concentration factor K*. ②

2. At room temperature, a 0.02-in. gap, as shown, exists between the ⅔-in. diameter aluminum rod *A* ($\alpha = 12.9\times10^{-6}/°\text{F}$, $E = 10.6\times10^{6}$ psi) and the ⅓-in. diameter bronze rod *B* ($\alpha = 12\times10^{-6}/°\text{F}$, $E = 15\times10^{6}$ psi). If the normal stress in the bronze bar *B* is $\sigma_B = -5$ ksi after a temperature rise of ΔT, determine (*a*) the value of ΔT, (*b*) the normal stress σ_A in the aluminum bar *A*. ⑧



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1. Sketch: ① $K = \dfrac{\sigma_{\max}}{\sigma_{\text{ave}}}$ ①

2. $\delta_T = \alpha(\Delta T)L$ $\delta_P = \dfrac{PL}{AE}$

$$P_A = P_B = P = 5\times10^{3}[\pi(1/6)^2]\ \text{lb} = 436.33\ \text{lb}$$ ②

$$\delta_{AT} + \delta_{BT} - 0.02 = \delta_{AP} + \delta_{BP}$$ ②

$$12.9\times10^{-6}(\Delta T)(12) + 12\times10^{-6}(\Delta T)(10) - 0.02 = \frac{436.33(12)}{\pi(1/3)^2(10.6\times10^{6})} + \frac{436.33(10)}{\pi(1/6)^2(15\times10^{6})}$$

$\Delta T = 90.1°\text{F}$ ② $\sigma_A = -1250$ psi ②