• compatibility ;

$$(\delta_T)_C - (\delta_F)_C + (\delta_T)_a - (\delta_F)_a = 0.008$$

$$9.4(10^{-6})(300-60)(4) - \frac{F(4)}{\frac{\pi}{4}(1.25^2)(18)(10^3)} + 13(10^{-6})(300-60)(8) - \frac{F(8)}{\frac{\pi}{4}(1.25^2)(10)(10^3)} = 0.008$$

$$\therefore F = 31.194 \text{ kip}$$

• Average Normal stress

$$\sigma_a = \sigma_c = \frac{F}{A} = \frac{31.194}{\frac{\pi}{4}(1.25^2)} = 25.4 \text{ (ksi)}$$

• Displacement ;

$$\delta_a = (\delta_T)_a - (\delta_F)_a$$

$$= 13(10^{-6})(300-60)(8) - \frac{31.194(8)}{\frac{\pi}{4}(1.25^2)(10)(10^3)}$$

$$= 0.004624 \text{ (in)}$$

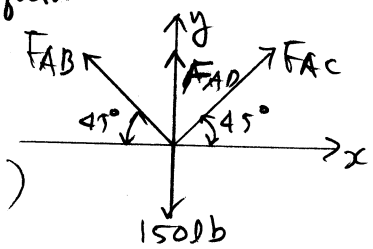
So, New Length

$$L'_a = L_a + \delta_a = 8 + 0.0046$$

$$= 8.0046 \text{ (in)}$$

4-92

• Equilibrium ;



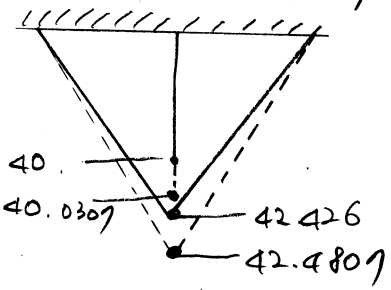
(symmetry)

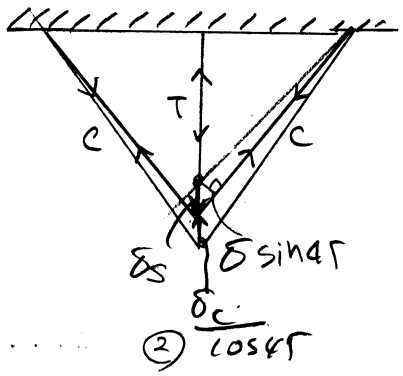
$F_{AB} = F_{AC} = F$

$$2F \cdot \sin 45 + F_{AD} = 150 \quad \cdots (1)$$

• compatibility ;

(i) consider only temperature.





$$2C \cdot \cos 45 = T \quad \cdots (2)$$

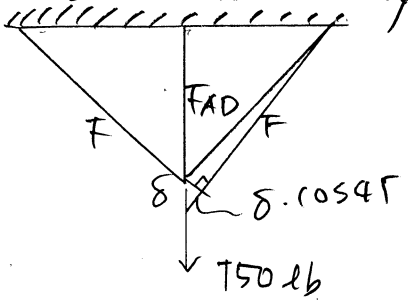
$$\delta_S = \frac{T \cdot L_S}{A_S E_S} = \frac{T \cdot 40.}{A_S(29)(10^3)}$$

$$\delta_{C/\cos 45} = \frac{C L_C}{A_C E_C} \frac{1}{\cos 45} = \frac{C(60)}{A_C(11)(10^3)\cos 45}$$

$$\delta_S + \delta_{C/\cos 45} = 42.4807 - 40.0307$$

$$\frac{T(40)}{A_S(29)(10^3)} + \frac{C(60)}{A_C(11)(10^3)\cos 45} = 2.45 \quad \cdots (3)$$

From (2) & (3)

$$T = 6.14 \text{ (lb)} \quad C = 4.34 \text{ (lb)}$$

(ii) Consider only Force 150 lb