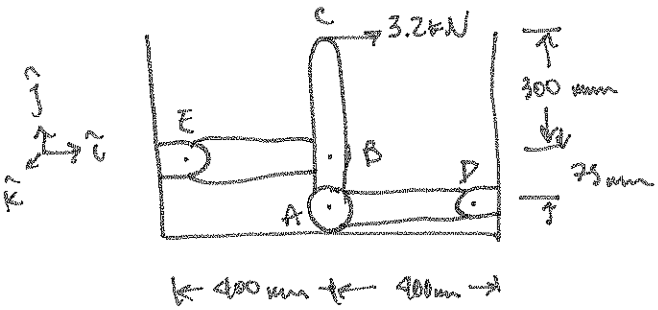
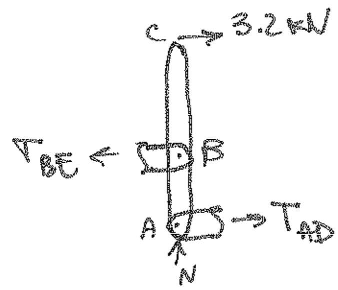
9.77. SOLUTION



$E = 200\ \mathrm{GPa}$, $A = 6 \times 18\ \mathrm{mm}$.

find δ_A, δ_B, δ_C.

FBD of ABC:



$\{\sum \vec{F} = \vec{0}\} \cdot \hat{i} \Rightarrow$

$T_{AD} - T_{BE} + 3.2\,\mathrm{kN} = 0$

$\{\sum \vec{M}_{/A} = \vec{0}\} \hat{k} \Rightarrow$

$T_{BE}(.075\,\mathrm{m}) - 3.2\,\mathrm{kN}(.375\,\mathrm{m}) = 0$

so $T_{BE} = 16\,\mathrm{kN}$, which means $T_{AD} = 19.2\,\mathrm{kN}$

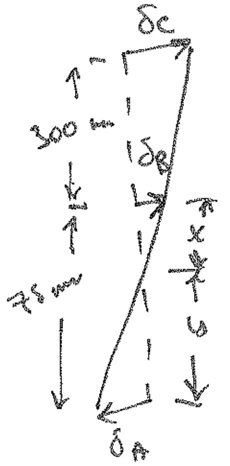
$$\delta_B = \frac{T_{BE} L_{BE}}{E A} = \frac{16\,\mathrm{kN}\ (.4\,\mathrm{m})}{200\,\mathrm{GPa}(.006\,\mathrm{m})(.018\,\mathrm{m})} = \boxed{2.97 \cdot 10^{-4}\,\mathrm{m}}$$

bar BE got longer

$$\delta_A = \frac{T_{AD} L_{AD}}{EA} = \frac{19.2\,\mathrm{kN}\ (.4\,\mathrm{m})}{200\,\mathrm{GPa}(.006\,\mathrm{m})(.018\,\mathrm{m})} = \boxed{3.56 \cdot 10^{-4}\,\mathrm{m}}$$

bar AD got longer

Geometry to find δ_C:



$$\frac{\delta_B}{x} = \frac{\delta_A}{y} \Rightarrow \frac{2.97}{x} = \frac{3.56}{y} \Rightarrow \frac{x}{y} = .83$$

$x + y = 75\,\mathrm{mm} \Rightarrow x = 34\,\mathrm{mm}$

$$\frac{\delta_B}{x} = \frac{\delta_C}{300+x} \Rightarrow \frac{2.97 \cdot 10^{-4}}{34\,\mathrm{mm}} = \frac{\delta_C}{334\,\mathrm{mm}}$$

$$\Rightarrow \delta_C = .0029\,\mathrm{m} = \boxed{2.9\,\mathrm{mm}}$$

Pt. C moved to the right