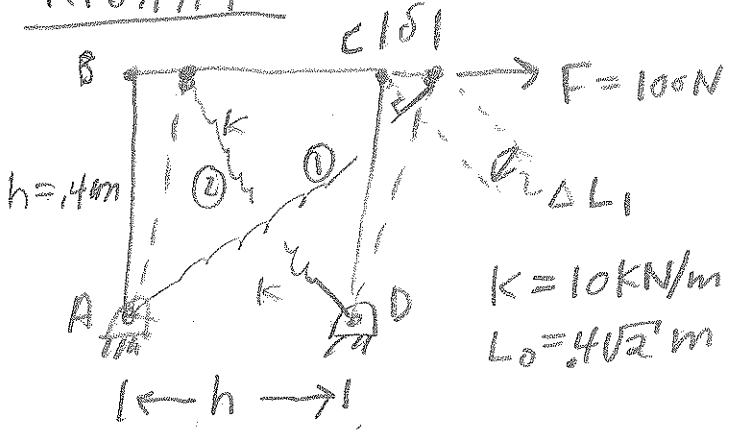
RP6.1.17




$\Delta L_1 = ?$
$\Delta L_2 = ?$

$K = 10\,kN/m$
$L_0 = .4\sqrt{2}\,m$

Assume $\delta \ll h$.

**Geometry**

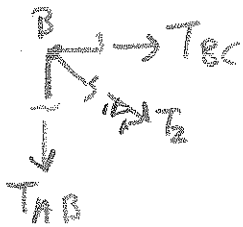
Eqn. 6.17 from text $\Rightarrow$ $\Delta L_1 = \delta/\sqrt{2}$ & $\Delta L_2 = -\delta/\sqrt{2}$

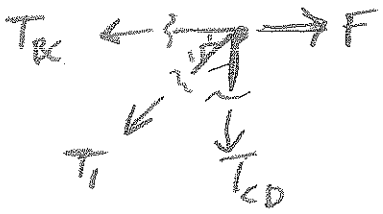
**Const. Laws**

$T_1 = K\Delta L_1$ & $T_2 = K\Delta L_2$

**Mechanics**

FBDs




$\Sigma F_x = 0 \Rightarrow T_{BC} = -T_2/\sqrt{2}$

$\Sigma F_x = 0 \Rightarrow F = T_{BC} + T_1/\sqrt{2}$

$\Rightarrow F = (T_1 - T_2)/\sqrt{2} = (K\delta/\sqrt{2} + K\delta/\sqrt{2})/\sqrt{2} = K\delta$

($T_1 = K\Delta L_1 = K\delta/\sqrt{2}$; $T_2 = K\Delta L_2 = -\delta/\sqrt{2}$)

$\Rightarrow \delta = F/K \Rightarrow$

$$\Delta L_1 = \frac{F}{K\sqrt{2}} = \frac{100\,N}{10^4\,N/m\,\sqrt{2}} = 7.07\cdot10^{-3}\,m$$

$$\Delta L_1 = -\Delta L_2 = -7.07\cdot10^{-3}\,m$$

Note $\Delta L \ll h$ so small deformation geometry was justified.