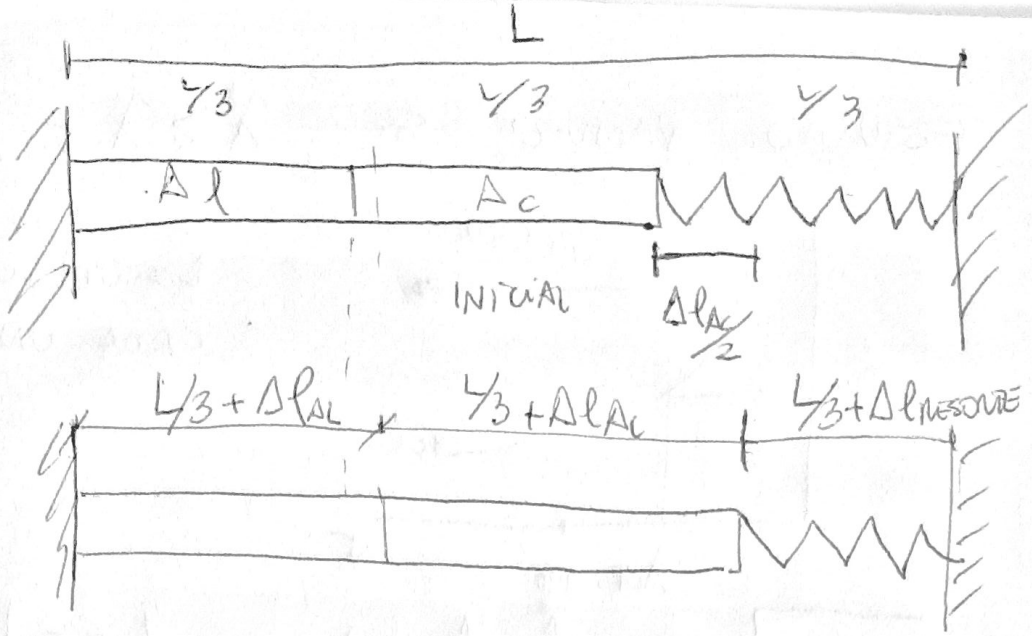
a)



① $\Delta l_{RESORTE} = -\Delta l_{Ac}/2 = \Delta x = F/K$

② $\Delta l_{Ac} + \Delta l_{Al} + \Delta l_{RESORTE} = 0$ $\quad (L_{inicial} = L_{final})$

①+② $\quad \Delta l_{Ac}/2 + \Delta l_{AL} = 0 \Rightarrow F = \dfrac{-(\frac{1}{2}\alpha_{Ac} + \alpha_{Al})\Delta T}{(\frac{1}{2}EA_{Ac} + \frac{1}{EA_{Al}})}$

$\Delta l_{Ac}(\Delta l_{Al}) = \delta_M + \delta_T = \alpha \Delta T . L + \dfrac{FL}{EA}$

$F = -65,234\ kN$

c) $\Delta x = -\Delta l_{Ac}/2 = -6,53 \times 10^{-6}\ m$

$\Delta l_{AL} = 13,06 \times 10^{-6}\ m \qquad \Delta l_{Al} = -6,53 \times 10^{-6}\ m$

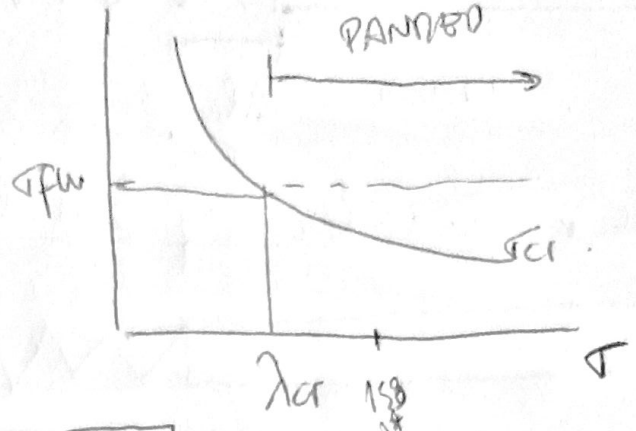
$\Delta x = F/K \Rightarrow -6,53 \times 10^{-6}\ m = -\dfrac{65234\ N}{K}$

$\Rightarrow \boxed{K = 9,996\ N/m}$

b) $F = -65,234\ kN = -F_{EMPOT}$

$F_{EMPOT} = 65,234\ kN$

d) ESTUDIO PANDEO si $\lambda^* > \lambda_{cr}$



$L = 0,15 m.$ CADA UNA

$\lambda_{cr} = \sqrt{\frac{E}{\sigma_{fw}}} \cdot \pi$ $\quad \lambda = \frac{L_e}{\rho}$ $\quad L_e = L \cdot \beta$

$\beta = 0,5$ $\quad \rho = \sqrt{\frac{I}{A}} =$

$\lambda_{cr\ Aluminio} = 99,34$ $\quad \lambda^* = 153,1$

$\lambda_{cr\ Acero} = 94,72.$ $\quad$ MISMO P/AMBOS

→ ubico mi PUNTO DE TRABAJO σ^*

$$\sigma^* = \frac{P}{A} = \frac{F}{A} = \frac{65234\ N}{0,00125\ m^2} = 52,2\ MPa$$

→ PANDEA si $\sigma^* > \sigma_{cr}$

DONDE $\sigma_{cr} = \frac{\pi^2 E}{\lambda^2} = \begin{cases} \text{Aluminio} = 29,5 MPa \\ \text{Acero} = 84,2 MPa \end{cases}$

$\sigma_{cr\ Acero} > \sigma^*$ NO PANDEA $\quad \| \quad \sigma_{cr\ Aluminio} < \sigma^*$ PANDEA