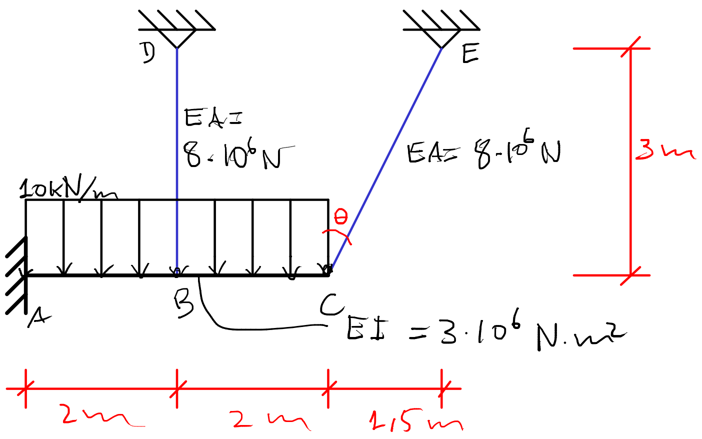
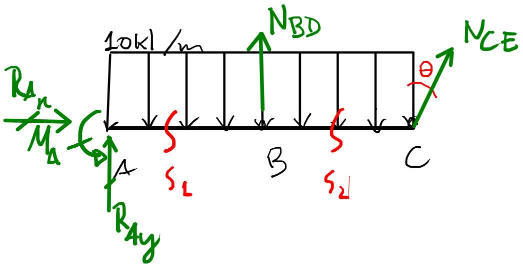


Determine as forças nos cabos BD e CE.

Forma direta:

Diagrama de corpo livre da viga ABC:



Condições de contorno:

$v_A = 0$ $\qquad v_B = -\Delta L_{BD}$ $\quad$ (v ⊕ p/ cima)

$v'_A = 0$ $\qquad v_C = \dfrac{\Delta L_{CE}}{\cos\theta}$

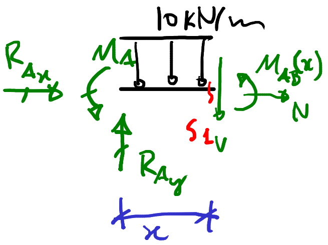
Continuidade:

$v'_{AB}(2m) = v'_{BC}(2m)$

$v_{AB}(2m) = v_{BC}(2m)$

- Momento Fletor:

Seccionando em S_1, olhando à esquerda:



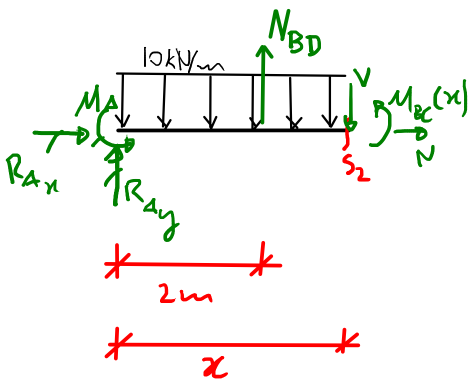
$0 \leq x \leq 2m$

$\Sigma M_{S_1} = 0$:

$$M_A - R_{Ay}x + 10kN/m \cdot \frac{x^2}{2} + M_{AB}(x) = 0$$

$$M_{AB}(x) = -5x^2 + R_{Ay} \cdot x - M_A \qquad (1)$$

S_2: $2m \leq x \leq 4m$



$\Sigma M_{S_2} = 0$

$$M_A - R_{Ay}x + 10 \cdot \frac{x^2}{2} - N_{BD}(x-2) + M_{BC}(x) = 0$$

$$M_{BC}(x) = -5x^2 + (R_{Ay} + N_{BD})x - M_A - 2N_{BD} \qquad (2)$$

De (1):

$$EI v''_{AB} = -5x^2 + R_{Ay} x - M_A$$

Integrando em x:

$$EI \cdot v'_{AB} = -\frac{5x^3}{3} + \frac{R_{Ay} x^2}{2} - M_A x + C_1$$

De (2):

$$EI v''_{BC} = -5x^2 + (R_{Ay} + N_{BD})x - M_A - 2N_{BD}$$

Integrando em x:

$$EI v'_{BC} = -\frac{5x^3}{3} + \frac{(R_{Ay} + N_{BD})}{2} \cdot x^2 - (M_A + 2N_{BD}) \cdot x + C_1$$

De (ii) $v'(0)=0$, logo $C_1=0$

Integrando novamente:

$$EI\cdot v_{AB} = \frac{-5x^4}{12} + \frac{R_{Ay}\cdot x^3}{6} - \frac{M_A x^2}{2} + C_2$$

De (i) $v(0)=0$, logo $C_2=0$

De (v):

$$\cancel{\frac{-5\cdot 2^3}{3}} + \cancel{\frac{R_{Ay}\cdot 2^2}{2}} - \cancel{M_A\cdot 2} = \cancel{\frac{-5\cdot 2^3}{3}} + \frac{(\cancel{R_{Ay}}+N_{BD})\cdot 2^2}{2} - (\cancel{M_A}+2N_{BD})\cdot 2 + C_1$$

$$C_1 = 2N_{BD}$$

Substituindo C_1 e integrando novamente:

$$EI\, v_{BC} = \frac{-5x^4}{12} + (R_{Ay}+N_{BD})\frac{x^3}{6} - (M_A+2N_{BD})\frac{x^2}{2} + 2N_{BD}x + C_2$$

De (vi):

$$\cancel{\frac{-5\cdot 2^4}{12}} + \cancel{\frac{R_{Ay}\cdot 2^3}{6}} - \cancel{\frac{M_A\cdot 2^2}{2}} = \cancel{\frac{-5\cdot 2^4}{12}} + (\cancel{R_{Ay}}+N_{BD})\frac{2^3}{6} - (\cancel{M_A}+2N_{BD})\frac{2^2}{2} + 4N_{BD} + C_2$$

$$C_2 = -\frac{4}{3}N_{BD} + 4N_{BD} - 4N_{BD}$$

$$\boxed{C_2 = -\frac{4}{3}N_{BD}}$$

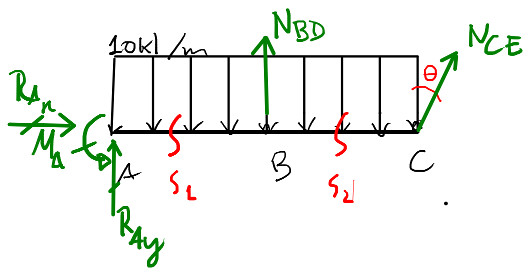
De (iii)

$$v(2m) = \frac{1}{EI}\left(\frac{-5\cdot 2^4}{12} + \frac{R_{Ay}\cdot 2^3}{6} - \frac{M_A\cdot 2^2}{2}\right) = -\Delta L_{BD} = -\frac{N_{BD}\cdot 3}{8\cdot 10^6} \quad (A)$$

De (iv):

$$L_{CE} = \sqrt{1{,}5^2 + 3^2} = 3{,}354$$

$$v(4m) = \frac{1}{EI}\left(\frac{-5\cdot 4^4}{12} + \frac{R_{Ay}\cdot 4^3}{6} - \frac{M_A\, 4^2}{2} + N_{BD}\left(\frac{4^3}{6} - \frac{2\cdot 4^2}{2} + 8 - \frac{4}{3}\right)\right) = -\frac{N_{CE}\cdot 3{,}354}{8\cdot 10^6\cdot \cos\theta} \quad (B)$$



$\Sigma M_C = 0$:

$$-4R_{Ay} + \frac{10\cdot 4^2}{2} - 2N_{BD} + M_A = 0 \quad (C)$$

$\Sigma F_y = 0$

$$R_{Ay} - 4\cdot 10 + N_{BD} + N_{CE}\cdot\cos(\theta) = 0 \quad (D)$$

Resolvendo o sistema:

$$N_{CE} = 12{,}069 \text{ kN}$$

$$N_{BD} = 10{,}91 \text{ kN}$$