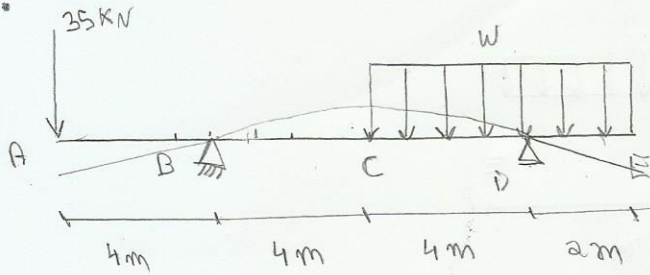


Aluno: Arthur Rodrigues Cardoso de Farias

1.



Dados:

$$I_3 = 351 \cdot 10^6 \text{ mm}^4$$

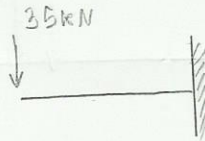
$$E = 200 \text{ GPa}$$

$$W = 80 \text{ kN/m}$$

• Vigas instantâneas

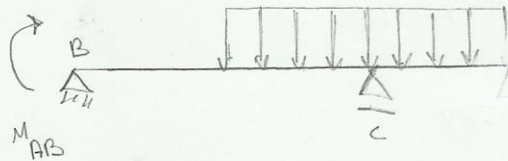
- Barra AB

$$V_A = -\frac{PL^3}{3EI} \quad (\text{segundo tabela})$$



$$V_A^1 = -\frac{(35 \text{ kN}) \cdot (4 \text{ m})^3}{3 \cdot (7,02 \cdot 10^4 \text{ kN} \cdot \text{m}^2)} = -10,63 \cdot 10^{-3} \text{ m}$$

- Barra BE:



Segundo a tabela de deflexão,

$$\theta_B = \frac{ML}{6EI} - \frac{Wa^2}{24LEI} (2L^2 - a^2) = \frac{(160 \text{ kN} \cdot \text{m}) \cdot (8 \text{ m})}{6 \cdot (7,02 \cdot 10^4 \text{ kN} \cdot \text{m}^2)} = 0,0030389 \text{ rad} + 0,0106363 \text{ rad}$$

$$V_A^2 = 4 \cdot 0,0106363 - 4 \cdot 0,0030389 =$$

• Logo, a deflexão no ponto A será:

$$V_A = V_A^1 + V_A^2 = -0,0106363 - 0,0212726 + 0,0425451 - 0,0121557 = -1,58 \text{ mm}$$

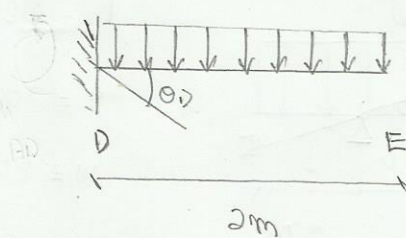
$$V_A = -0,0015195 \text{ m}$$

1. (cont.)

$$R_b = 1$$

• Rotação no ponto D:

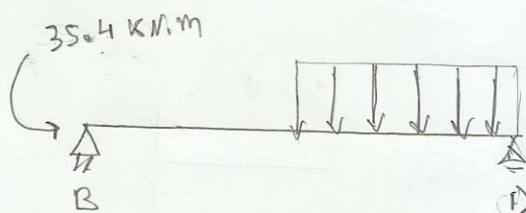
$M_D$  é um recalque



$$M_D = -R_b(L_{bc} + L_{cd}) + w \frac{(L_{cd})^2}{2} + 35(L_{cb} + L_{bc})$$

• Nessa forma, dá para achar  $\theta_D$

pela superposição.



• F. achas  $R_D$

$$\theta_D =$$

$$\sum F_v = 0 \quad -35 + R_b - 48 + R_D$$

$$R_D + R_b = 515$$

$$\sum M_B = 0$$

$$35.4 - 480.7 + 8R_D = 0$$

$$R_D = 402.5 \text{ kN}$$

$$R_B = 112.5 \text{ kN}$$

2020, Rotação no ponto D

$$\theta_D^I = \frac{qL^3}{6EI} = \frac{20 \cdot (2^3)}{6 \cdot 51} = \frac{160}{306} = 0.523$$

(carga distribuída em engaste)

$$\theta_D^{II} = 1$$