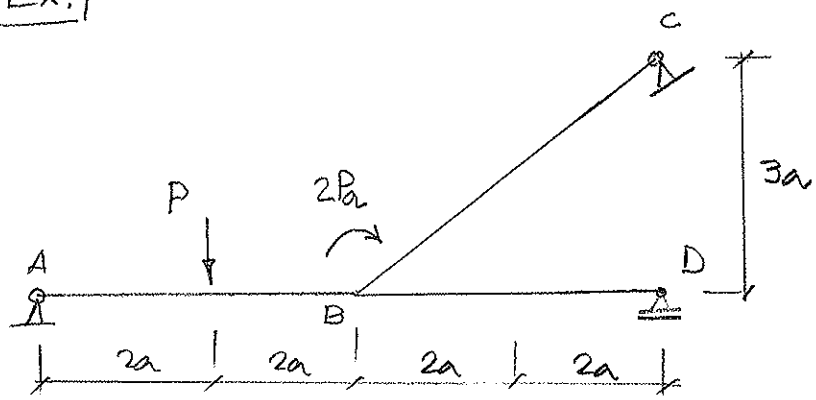
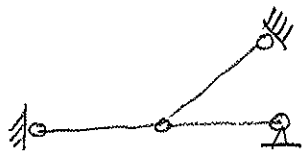
Ex.



a) $EI = \text{const.}$

$GH = 5 - 3 = 2$



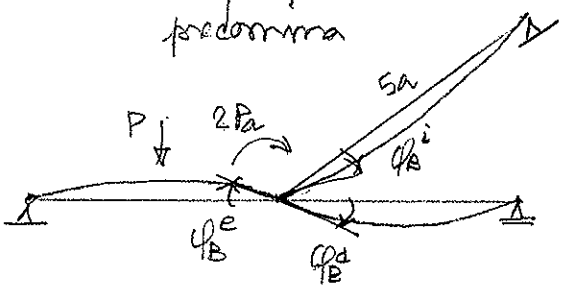
Estrutura indeslocável
↳ pode ser modelada por barras biapoiadas

b) Deformada & cálculo das rotações

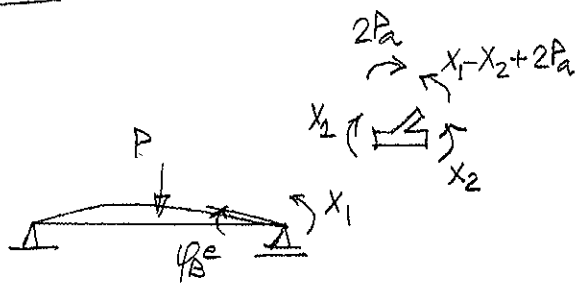
c) Resolução.

- a convenção de sinais é estabelecida na própria deformada respeitando a compatibilidade das rotações.
- eq. de compatibilidade (2)

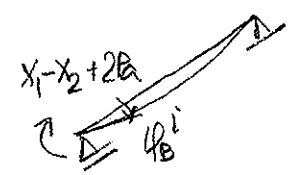
$$\varphi_B^e = \varphi_B^d = \varphi_B^i$$



EIF



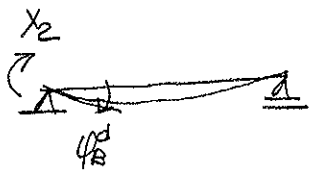
(1)



$$\varphi_B^e = \varphi_B^d$$

$$\frac{4}{3}\frac{X_1 a}{EI} + \frac{4}{3}\frac{X_2 a}{EI} = -\frac{Pa^2}{EI}$$

$$X_1 + X_2 = -\frac{3}{4}Pa$$



$$\varphi_B^d = \varphi_B^i$$

$$-\frac{5}{3}X_1 + \frac{9}{3}X_2 = \frac{10}{3}Pa$$

$$-5X_1 + 9X_2 = 10Pa$$

$$\varphi_B^e = -\frac{P(4a)^2}{16EI} - \frac{X_1 4a}{3EI} = -\frac{Pa^2}{EI} - \frac{4}{3}\frac{X_1 a}{EI}$$

$$\varphi_B^i = \frac{(X_1 - X_2 + 2Pa)5a}{3EI} = \frac{5}{3}\frac{X_1 a}{EI} - \frac{5}{3}\frac{X_2 a}{EI} + \frac{10}{3}\frac{Pa}{EI}$$

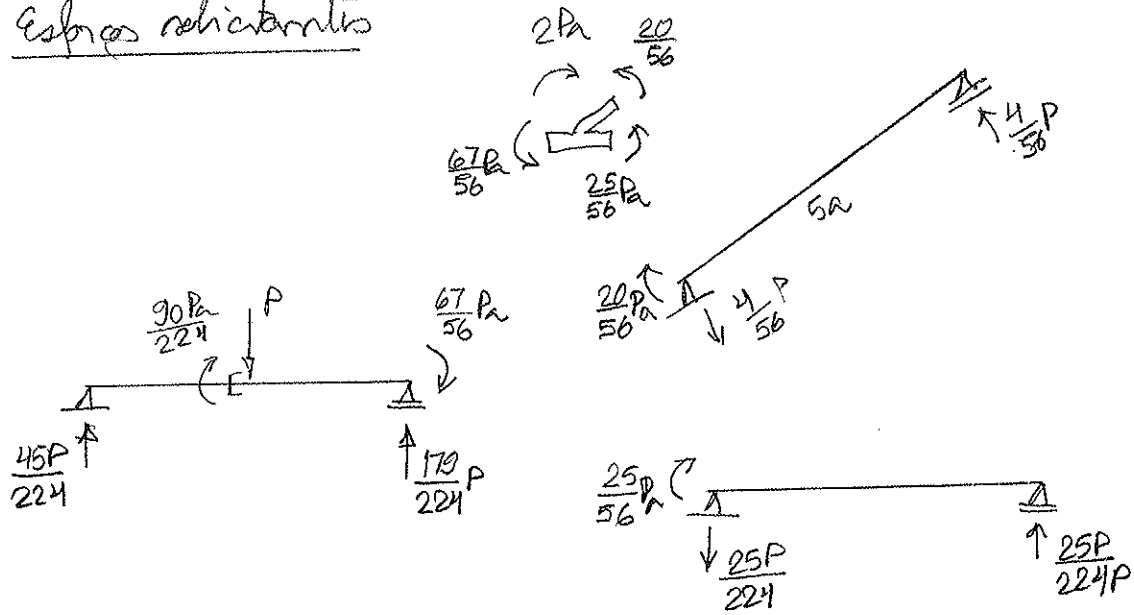
$$\varphi_B^d = \frac{X_2 \times 4a}{3EI} = \frac{4}{3}\frac{X_2 a}{EI}$$

$$\begin{bmatrix} 1 & 1 \\ -5 & 9 \end{bmatrix}\begin{bmatrix} X_1 \\ X_2 \end{bmatrix} = \begin{bmatrix} -3/4 \\ 10 \end{bmatrix} Pa$$

$$X_1 = \frac{\begin{bmatrix} -3/4 & 1 \\ 10 & 9 \end{bmatrix}}{14} Pa = \frac{-\frac{27}{4} - 10}{14} Pa = \frac{-67}{56} Pa$$

$$X_2 = \frac{\begin{bmatrix} 1 & -3/4 \\ -5 & 10 \end{bmatrix}}{14} = \frac{10 - \frac{15}{4}}{14} = \frac{25}{56} Pa$$

d) Esfuerzos solicitantes



Diagramas: