

Ex.

[Diogo, p.30]

Determine a reação R_B e a rotação ϕ_B do apoio B da viga contínua de rigidez EI decorrente de um recalque do apoio B igual a b



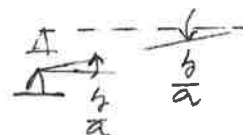
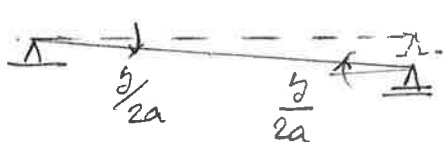
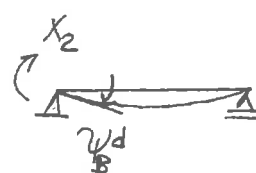
Compatibilidade:

$GH = 5 - 3 = 2$

$\psi_A = 0$

$\psi_B^e = \psi_B^d$

EIF



$$\psi_A = \frac{X_1 2a}{3EI} + \frac{X_2 2a}{6EI} + \frac{b}{2a}$$

$\psi_A = 0 \Rightarrow$

$$\frac{2}{3}X_1 + \frac{1}{3}X_2 = -\frac{bEI}{2a^2}$$

$$\psi_B^e = \frac{X_1 2a}{6EI} + \frac{X_2 2a}{3EI} - \frac{b}{2a}$$

$\psi_B^e = -\psi_B^d \Rightarrow$

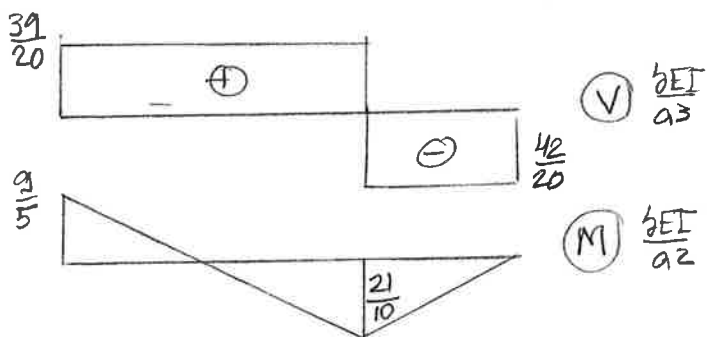
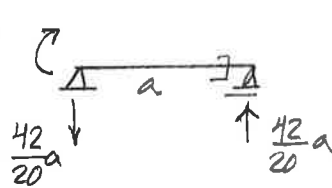
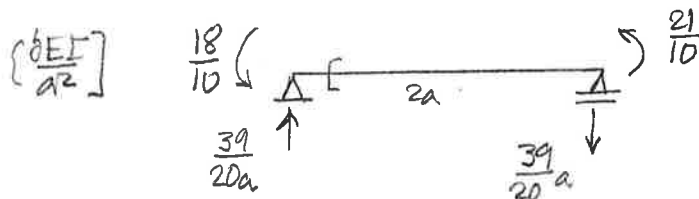
$$\frac{1}{3}X_1 + X_2 = +\frac{3}{2}\frac{bEI}{a^2}$$

$$\psi_B^d = \frac{X_2 a}{3EI} - \frac{b}{a}$$

$$\begin{cases} -2X_1 - X_2 = \frac{3}{2}\frac{bEI}{a^2} \\ \frac{1}{3}X_1 + X_2 = \frac{3}{2}\frac{bEI}{a^2} \end{cases}$$

$$-\frac{5}{3}X_1 = 3\frac{bEI}{a^2} \Rightarrow X_1 = -\frac{9}{5}\frac{bEI}{a^2}$$

$$-X_2 = \left(\frac{3}{2} - \frac{18}{5}\right)\frac{bEI}{a^2} \Rightarrow X_2 = \frac{21}{10}\frac{bEI}{a^2}$$



$$R_B = \left(\frac{39}{20} + \frac{42}{20}\right)\frac{bEI}{a^2} = \frac{81}{20}\frac{bEI}{a^2}$$

$$\phi_B = \psi_B^d = \frac{\left(\frac{21}{10}\frac{bEI}{a^2}\right)a}{3EI} - \frac{b}{a} = \frac{3}{10}\frac{b}{a}$$