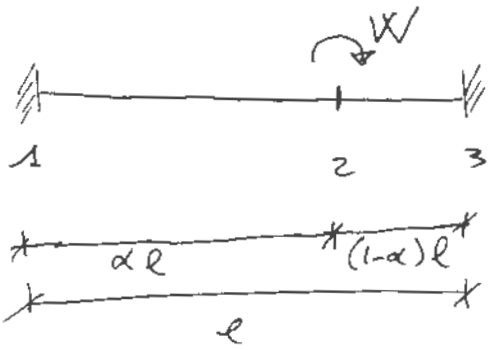
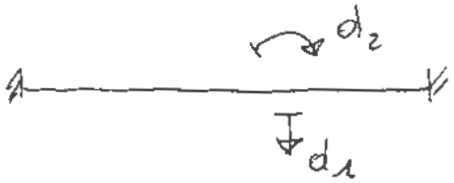


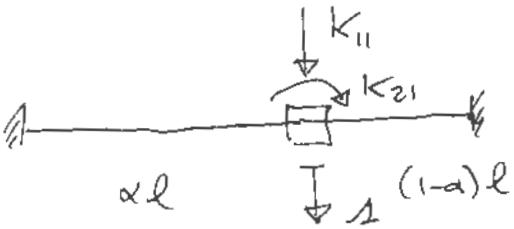
Trovare rigidezza alla rotazione in 2

$\alpha \in (0,1)$

Metodo della condensazione statica (della matrice di rigidezza)

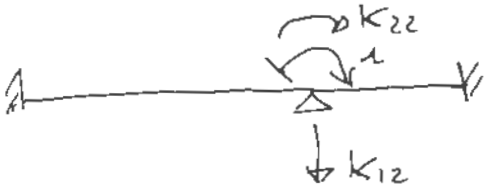


prima colonna:



$$K_{11} = \frac{12EJ}{(\alpha\ell)^3} + \frac{12EJ}{[(1-\alpha)\ell]^3} \qquad K_{21} = -\frac{6EJ}{(\alpha\ell)^2} + \frac{6EJ}{[(1-\alpha)\ell]^2}$$

seconda colonna:

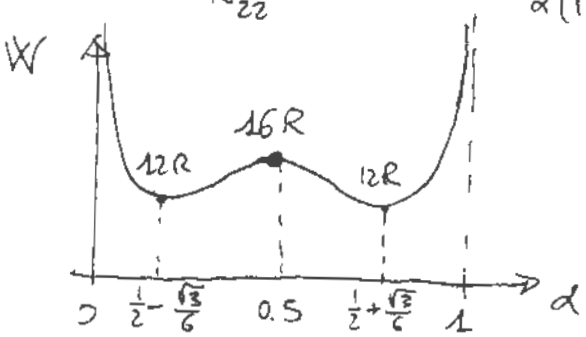


$$K_{12} = K_{21} \qquad K_{22} = \frac{4EJ}{\alpha\ell} + \frac{4EJ}{[(1-\alpha)\ell]}$$

la rigidezza è l'azione richiesta per ottenere il movimento unitario, dopo

$$\begin{pmatrix} K_{11} & K_{12} \\ K_{21} & K_{22} \end{pmatrix} \begin{pmatrix} d_1 \\ d_2 = 1 \end{pmatrix} = \begin{pmatrix} P_1 = 0 \\ P_2 = W \end{pmatrix} \qquad \begin{cases} K_{11} d_1 + K_{12} = 0 \\ K_{21} d_1 + K_{22} = W \end{cases} \Rightarrow d_1 = -\frac{K_{12}}{K_{11}}$$

$$W = K_{22} - \frac{K_{12}K_{21}}{K_{22}} = \dots = \frac{4}{\alpha(1-\alpha)(3\alpha^2 - 3\alpha + 1)} \qquad \left(\frac{EJ}{\ell} = R\right)$$



$\alpha \to 0$, $\alpha \to 1$ $\Rightarrow W \to \infty$

$\alpha = \frac{1}{2} \Rightarrow W = 16R$

$\alpha = \frac{1}{2} \pm \frac{\sqrt{3}}{6} \Rightarrow W = 12R$

es. $\alpha = \frac{1}{4}$

$W = \frac{256}{21} \simeq 12.2R$