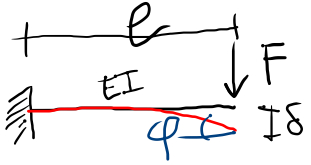
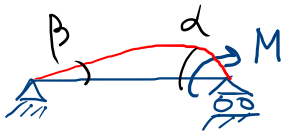
RIPASSO DEI COEFF DI RIGIDEZZA IN SCHEMI STATICI NOTEVOLI

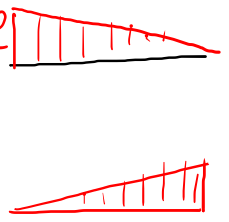
23/03/23



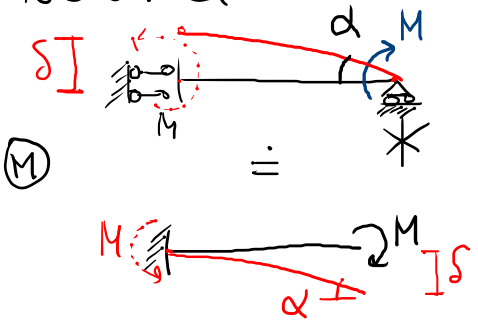
$\delta = \frac{F\ell^3}{3EI}$, $\varphi = \frac{F\ell^2}{2EI}$



$\alpha = \frac{M\ell}{3EI}$, $\beta = \frac{M\ell}{6EI}$



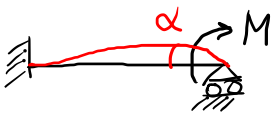
(M)



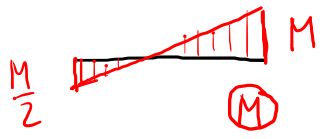
TAGLIO NULLO

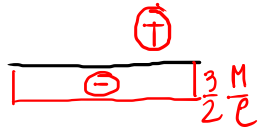
$\alpha = \frac{M\ell}{EI}$

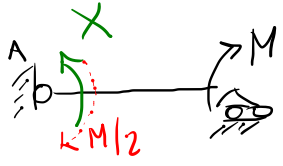
$\delta = \frac{M\ell^2}{2EI}$



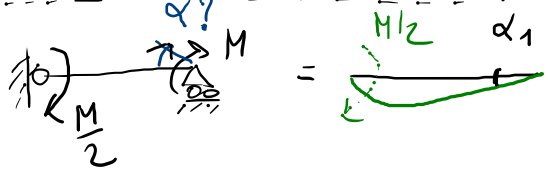
$\alpha = \frac{M\ell}{4EI}$

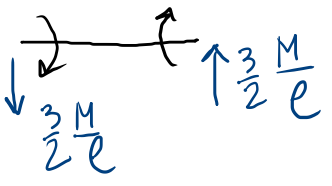






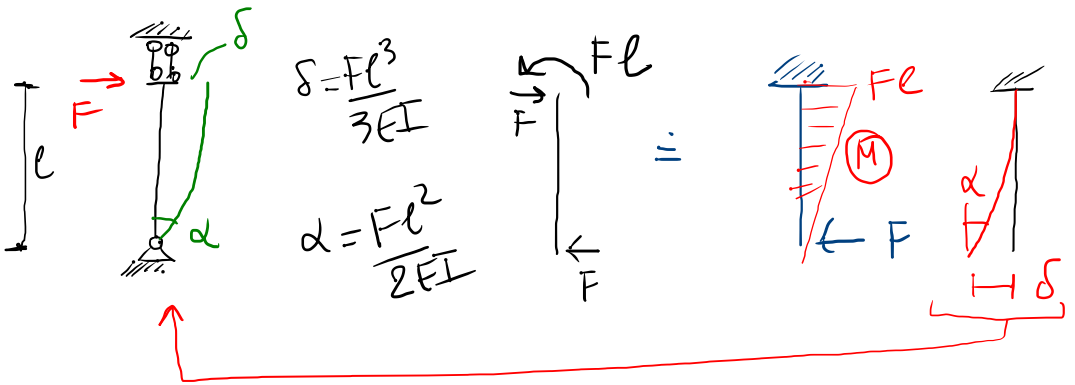
$+\circlearrowleft \varphi_A = 0$; $\frac{X\ell}{3EI} + \frac{M\ell}{6EI} = 0$; $X = -\frac{M}{2}$

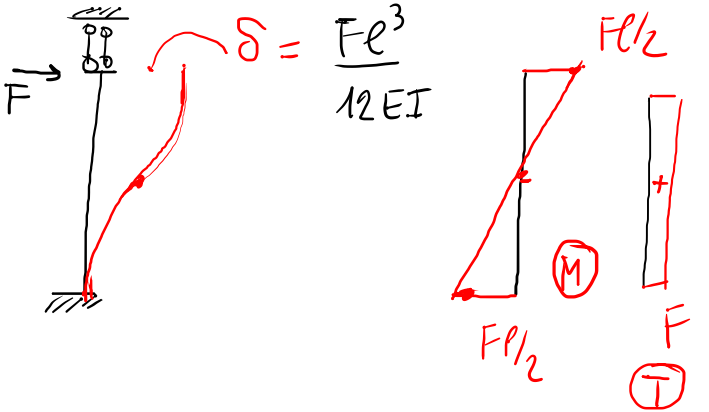


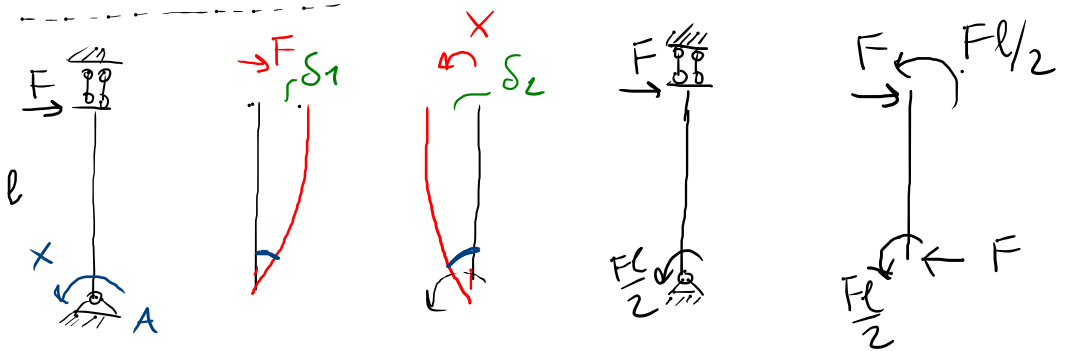


$\alpha = \alpha_2 - \alpha_1$

$= \frac{M\ell}{3EI} - \frac{(M/2)\ell}{6EI} = \frac{4-1}{12} = \frac{1}{4}\,\frac{M\ell}{EI}$







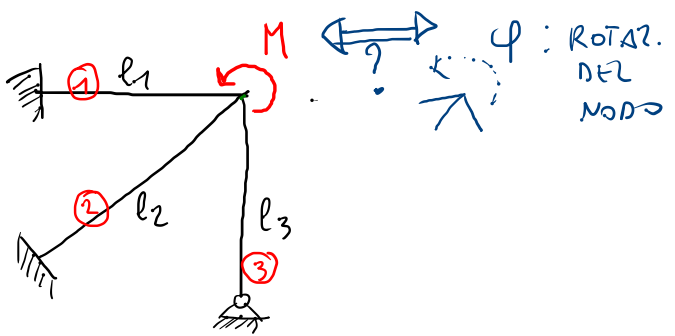
$$+\circlearrowleft \varphi_A = 0 : \quad -\frac{Fl^2}{2EI} + \frac{Xl}{EI} = 0$$

$$X = \frac{Fl}{2}$$

$$\delta = +\delta_1 - \delta_2$$

$$= \frac{Fl^3}{3EI} - \frac{Fl}{2}\,\frac{l^2}{2EI} = \frac{4-3}{12} = \frac{1}{12}\,\frac{Fl^3}{EI}$$

1° ESEMPIO: RIGIDEZZA DI UN NODO DI UN TELAIO CON 1 G.D.L. ROTAZIONALE

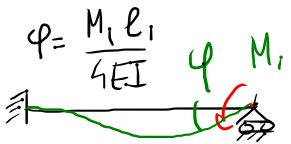


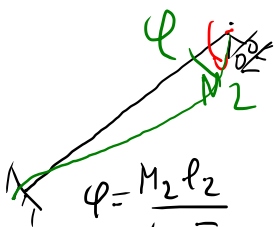
LO STUDIO DELLA RIGIDEZZA DI NODO SI COMPIE OTTENENDO LA RELAZIONE ELASTICA TRA

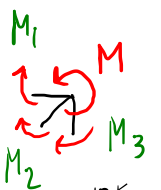
M e φ.

[OSSERVAZIONE: NEL TELAIO c'è IL G.D.L. ROTAZIONALE PERCHÉ TRASCURO LA DEFORMABILITÀ ASSIALE
⇒ IL NODO NON TRASLA! RIMANE SOLO LA ROTAZ.
NODO FISSO

EI cost.





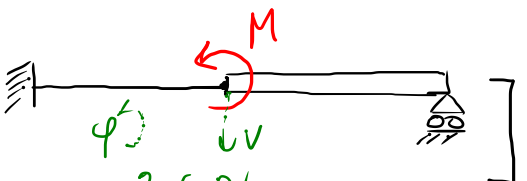


$\varphi = \frac{M_3 l_3}{3EI}$

PER CONGRUENZA SIA IL NODO CHE GLI ESTREMI DELLE TRAVI RUOTANO DI φ

EQUILIBRIO DI NODO: $M - M_1 - M_2 - M_3 = 0$

$$M - \frac{4EI}{l_1}\varphi - \frac{4EI}{l_2}\varphi - \frac{3EI}{l_3}\varphi = 0$$ ⇒ OTTENGO L'INCOGNITA φ



$$\varphi = \frac{M}{\frac{4EI}{\ell_1} + \frac{4EI}{\ell_2} + \frac{3EI}{\ell_3}}$$

COEFF. DI RIGIDEZZA (K)

$$\Rightarrow K\varphi = M$$

$$\alpha = \frac{M\ell}{3EI} = \frac{M}{\frac{3EI}{\ell}}$$

NOTO φ POSSO CALCOLARE LE SOLLECITAZ. NELLE SINGOLE TRAVI

CALCOLANDO M_1, M_2, M_3

$$M_1 = \frac{K_1}{\frac{4EI}{\ell_1}} \frac{M}{K} = \rho_1 \frac{K_1}{K} M$$

$$M_2 = \frac{4EI}{\ell_2} \frac{M}{K} = \rho_2 \frac{K_2}{K} M$$

$$M_3 = \frac{3EI}{\ell_3} \frac{M}{K} = \rho_3 \frac{K_3}{K} M$$

$$K = \sum_i k_i$$

ρ_i: COEFF DI RIPARTIZ. < 1

$$\sum_i \rho_i = 1$$

SOLUZ. TRAVE 1