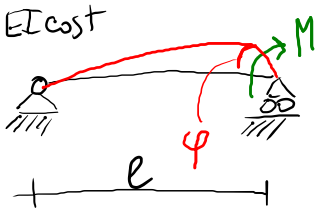
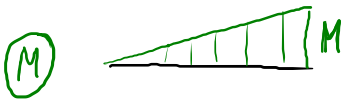
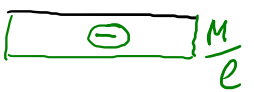
RIPASSO DEI COEFF. DI RIGIDEZZA DI SCHEMI STATICI NOTEVOLI

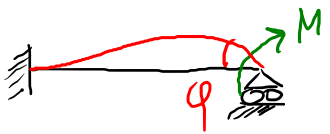
18/4/24



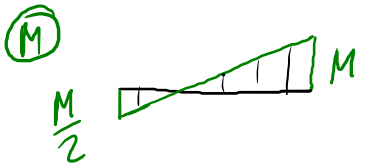
$$\varphi = \frac{M\ell}{3EI} \Rightarrow M = \frac{3EI}{\ell}\varphi$$

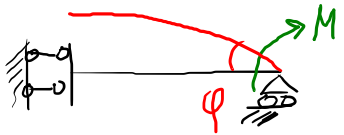




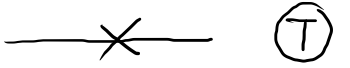


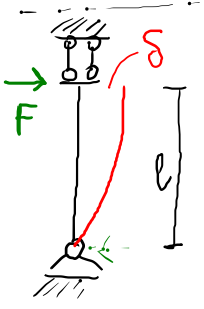
$$\varphi = \frac{M\ell}{4EI} \Rightarrow M = \frac{4EI}{\ell}\varphi$$





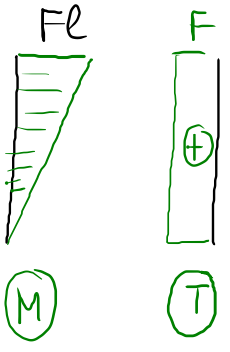
$$\varphi = \frac{M\ell}{EI} \Rightarrow M = \frac{EI}{\ell}\varphi$$

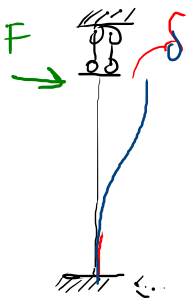




$$\delta = \frac{F\ell^3}{3EI}$$

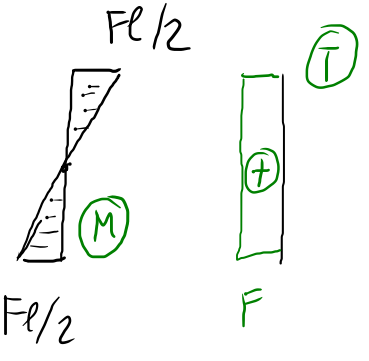
$$F = \frac{3EI}{\ell^3}\delta$$



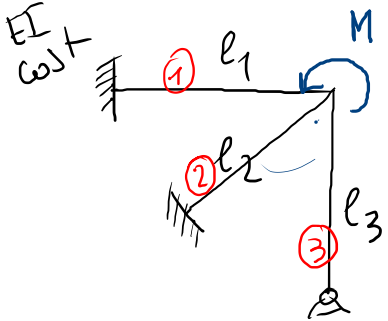


$$\delta = \frac{F\ell^3}{12EI}$$

$$F = \frac{12EI}{\ell^3}\delta$$



RIPARTIZ. DI UN MOMENTO AL NODO DI UN TELAIO (NODO FISSO)

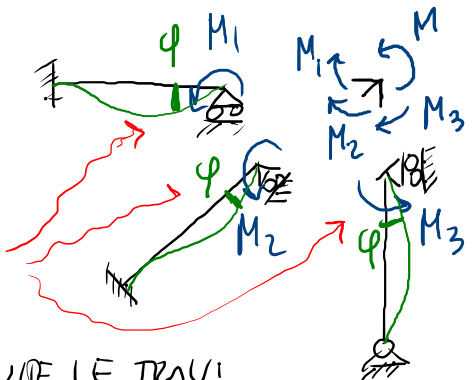


$\Longleftrightarrow$ φ: ROTAZ. DEL NODO INCOGNITA

$\Rightarrow$ $M = K\varphi$

↑ RIGIDEZZA DEL NODO

LO STUDIO DEL TELAIO CON IL METODO DEGLI SPOSTAMENTI PERMETTE DI CALCOLARE, OLTRE ALL'INCOGNITA φ, LA RIGIDEZZA DEL NODO K



TUTTE LE TRAVI RUOTANO DI φ PER CONGRUENZA

RISOLVO IL PROBLEMA SCRIVENDO EQUAZ. DI EQUIL.

$$M - M_1 - M_2 - M_3 = 0$$

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

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

COEFF. DI RIPARTIZ.

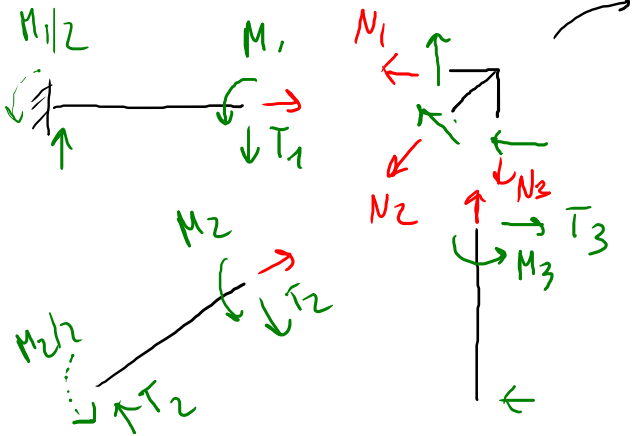
$$M_1 = \left(4\frac{EI}{\ell_1}\right)\frac{M}{K} = \rho_1 M$$

$$M_2 = \left(4\frac{EI}{\ell_2}\right)\frac{M}{K} = \rho_2 M$$

$$M_3 = \left(3\frac{EI}{\ell_3}\right)\frac{M}{K} = \rho_3 M$$

$\sum_i \rho_i = 1$

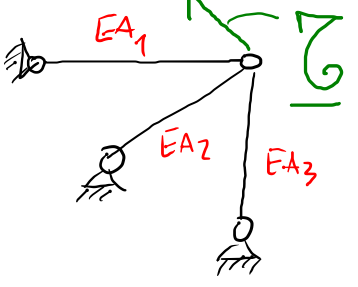
NOTA: IL TELAIO È A NODO FISSO PERCHÈ TRASCURIAMO LA DEFORM. ASSIALE E QUINDI IL "NODO" STESSO NON TRASLA. VERIFICARE LA BONTÀ DI QUESTA APPROSSIMAZIONE.



→ ATTRAVERSO L'EQUILIBRIO DELLE FORZE NEL NODO POSSO CALCOLARE LE FORZE NORMALI N_1, N_2, N_3:

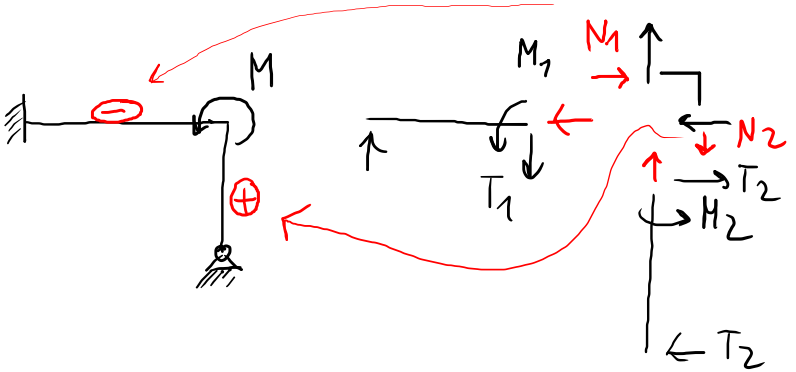
$$\left.\begin{aligned} \overset{+}{\rightarrow} \quad & \Sigma_i T_{ix} + \Sigma_i N_{ix} = 0 \\ +\uparrow \quad & \Sigma_i T_{iy} + \Sigma_i N_{iy} = 0 \end{aligned}\right\} \quad \begin{matrix} 2 \text{ EQUAZ. IN} \\ 3 \text{ INCOGNITE} \end{matrix}$$

IL PROBL. DEL CALCOLO DI N_i È UN PROBLEMA IPERSTATICO.



$$\underline{T} = \underline{T}_1 + \underline{T}_2 + \underline{T}_3$$

RETIC. IPERST. (1 VOLTA) → M. FORZE
RETIC. IPERST. (1 VOLTA) → M. SPOST.



$N_1 = T_2$

$N_2 = T_1$

2 EQ. IN 2 INCOGNITE $\begin{cases} N_1 \\ N_2 \end{cases}$