EQUAZ. DI EQUIL. PUNTUALE (INDEFINITE) $N, T, M, p, q = f(z)$ 10/11/2022

$$\begin{cases} \dfrac{dN}{dz} = -p \\ \dfrac{dT}{dz} = -q \\ \dfrac{dM}{dz} = T \end{cases}$$

PROBLEMA ASSIALE

PROBLEMA FLESSIONE

$p = \text{cost} \Rightarrow N$ LINEARE

$p = 0 \Rightarrow N <$ COSTANTE

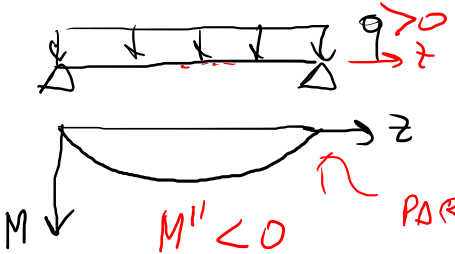
$$\boxed{\frac{d^2M}{dz^2} = -q}$$

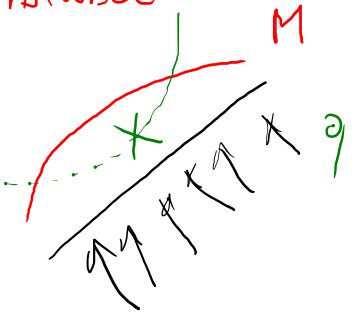
$q = 0$, $T <$ COSTANTE $\Rightarrow M$ LINEARE.

$q = \text{cost} \Rightarrow T$ LINEARE $\Rightarrow M$ PARABOLICO

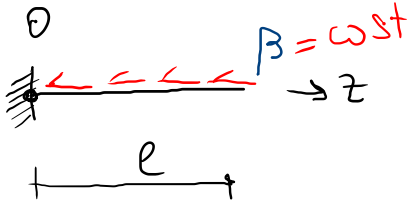
M : STAZIONARIO

T : NULLO



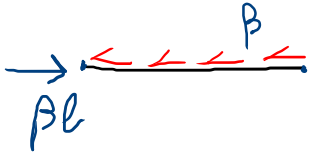


ES: PROBL. ASSIALE



$p(z) = -\beta$

$N(z) = \beta z - \beta \ell$



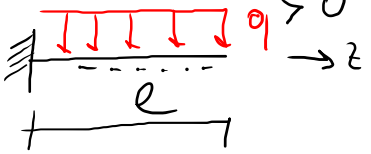
S.C.L.

$$\begin{cases} N'(z) = +\beta \\ N(0) = -\beta\ell \end{cases} \quad \text{(COMPRESSIONE)}$$

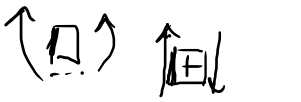
$N(z) = \beta z + C$

$N(0) = -\beta\ell = C$

PROBL. FLESSIONALE



S.C.L.



$$\begin{cases} T'(z) = -q \\ T(0) = +q\ell \end{cases} ; \quad T(z) = -qz + C_1 \qquad C_1 = +q\ell$$

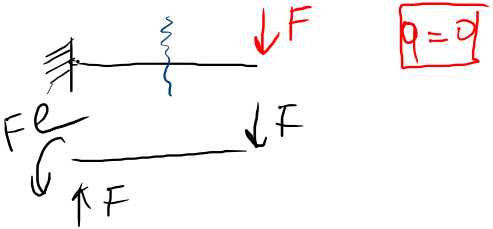
$T(z) = -qz + q\ell$

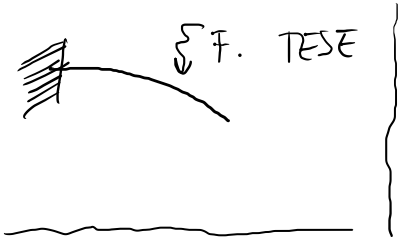
$$\begin{cases} M'(z) = T = -qz + q\ell \\ M(\ell) = 0 \end{cases} ; \quad M(z) = -q\frac{z^2}{2} + q\ell z + C_2$$

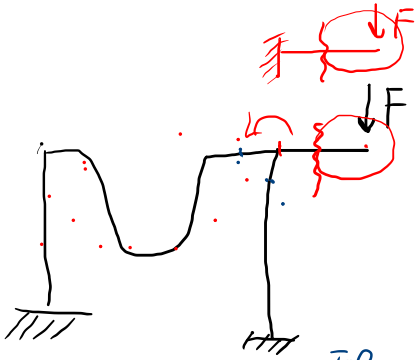
$$-q\frac{\ell^2}{2} + q\ell^2 + C_2 = 0$$

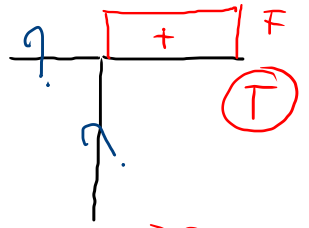
$$C_2 = -q\frac{\ell^2}{2}$$

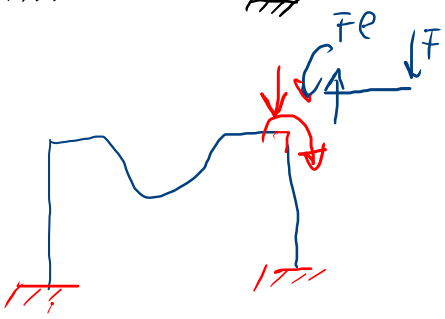
$$M(z) = -q\frac{z^2}{2} + q\ell z - q\frac{\ell^2}{2}$$

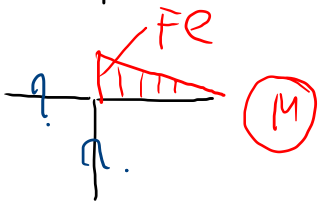




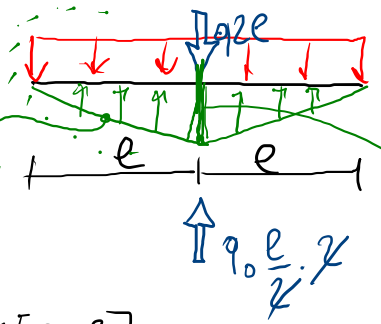








ESEMPIO DI
"APPENDICE ISOSTATICA"



LES

SCL

$\bar{q}(z) =$

$q_0 ? = 2q$

$\frac{q_0}{\ell} z$

$q_0 \frac{\ell}{2} \cdot \frac{1}{2}$

$T, M, z \in [0, \ell]$

$q(z) = ?$ $\quad q - \bar{q}(z)$

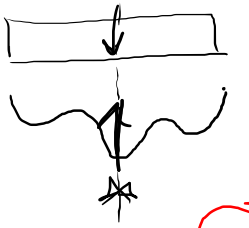
$= q - \frac{q_0}{\ell} z = \boxed{q - \frac{2q}{\ell} z}$

$T'(z) = -q(z)$

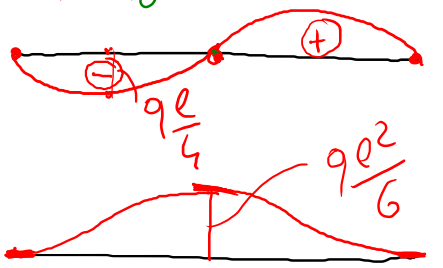
$$\begin{cases} T' = \frac{2q}{\ell} z - q \\ T(0) = 0 \end{cases} \quad ; \quad T(z) = \frac{2q}{\ell} \frac{z^2}{2} - qz + C_1 \qquad C_1 = 0$$

$$T\left(\frac{\ell}{2}\right) = \frac{q}{\ell} \frac{\ell^2}{4} - q\frac{\ell}{2}$$

$$\begin{cases} M'(z) = q\frac{z^2}{\ell} - qz \\ M(0) = 0 \end{cases} \quad ; \quad M(z) = \frac{q}{\ell} \frac{z^3}{3} - q\frac{z^2}{2} + C_2 \qquad C_2 = 0$$



T



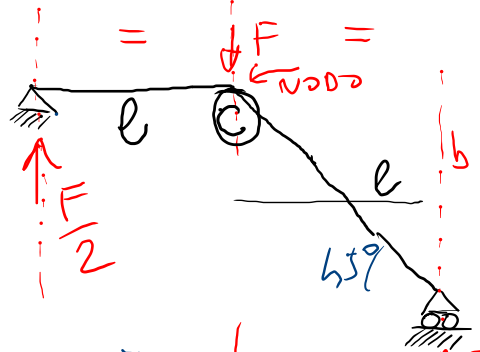
M

{ STR SYM
CARICATE SYM

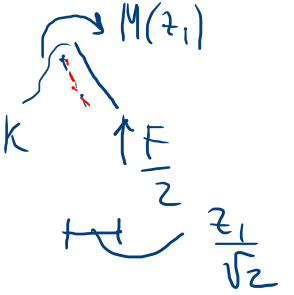
M → SYM

T → ANTISYM

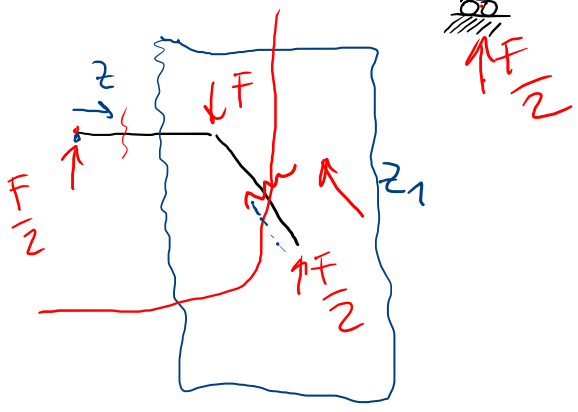
ES

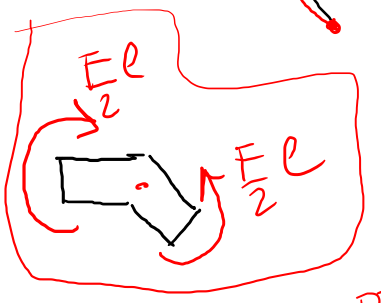


M



$$\overset{+}{\circlearrowleft_K}: -M + \frac{F}{2}\frac{z_1}{\sqrt{2}} = 0$$



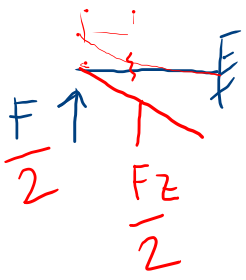


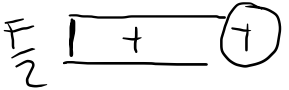
NODO BILANCIATO (IN EQUILIBRIO)

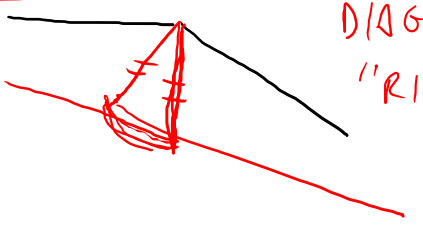
DUE ASTE CONVERGENTI

$$M(z_1) = \frac{F}{2}\frac{z_1}{\sqrt{2}}$$

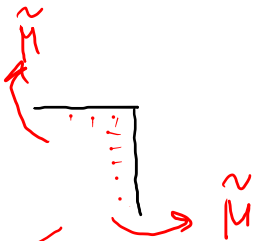
$$M(\ell\sqrt{2}) = \frac{F}{2}\ell$$

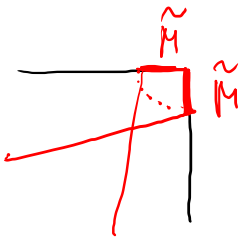


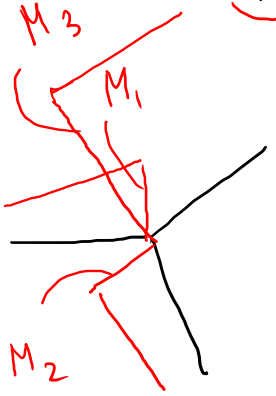




DIAGR SI "RIBALTA" INTERNAMENTE

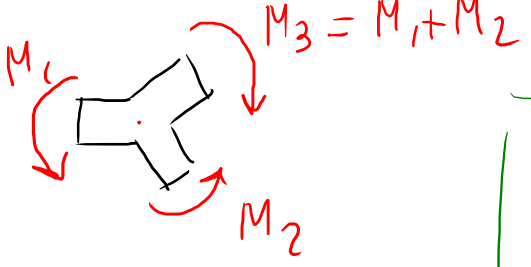


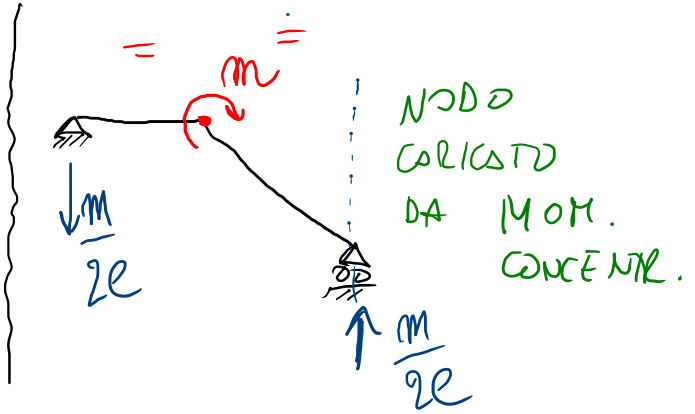


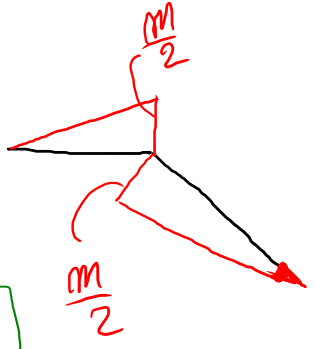


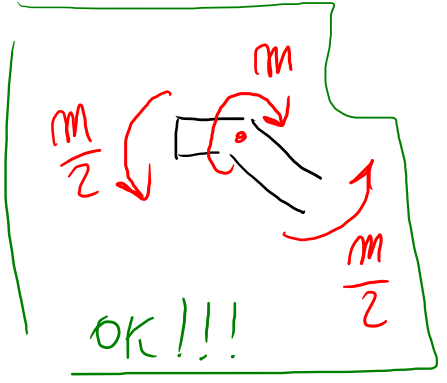
TRE ASSE CONVERGENTI IN NODO "SCARICO"

$$\sum_{i=1}^{3} M_i = 0$$



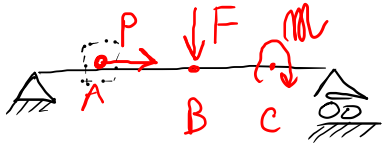


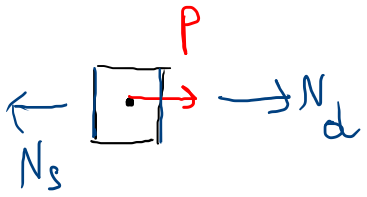




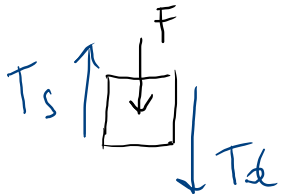
$\Sigma M = 0$

DISCONTINUITA' DI CARICO LUNGO L'ASSE DELLA TRAVE

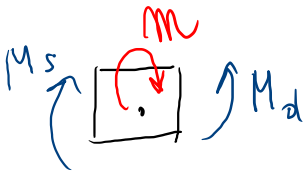




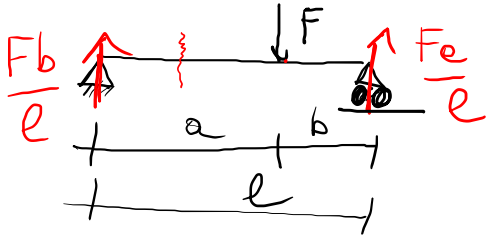
$$\pm\rightarrow: N_d + P - N_s = 0 \quad ; \quad \boxed{N_d - N_s = -P} \qquad \Delta N$$

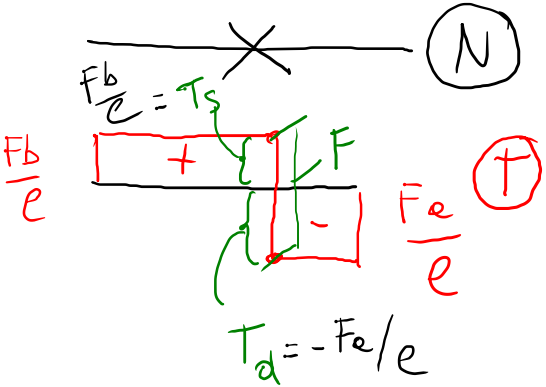


$$+\uparrow: T_s - F - T_d = 0 \quad ; \quad \boxed{T_d - T_s = -F} \qquad \Delta T$$

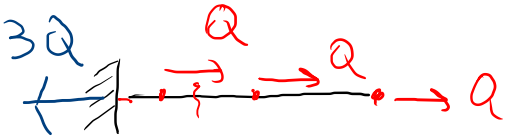


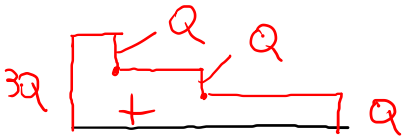
$$+\circlearrowleft \; -M_s - m + M_d = 0 \quad ; \quad \boxed{M_d - M_s = m} \qquad \Delta M$$





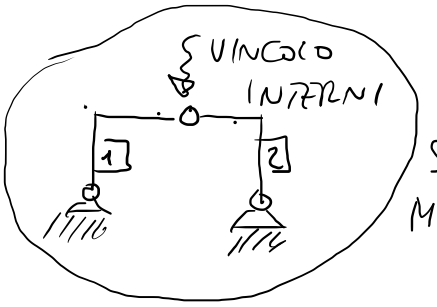
$$-\frac{Fa}{\ell} - \frac{Fb}{\ell} = -F \qquad \text{(OK!)}$$





(N)

CLASSIFICAZ. VINCOLI INTERNI

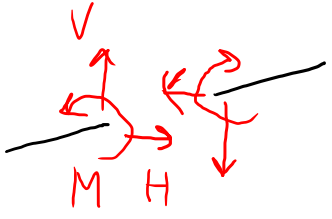


VINCOLO INTERNO È UN DISPOSITIVO MECCANICO IN GRADO DI LIMITARE IN TUTTO O IN PARTE UN MOTO RELATIVO TRA COMPONENTI DEL SISTEMA.

- INCASTRO INTERNO ($v=3$) UNICO VINCOLO TRIPLO

ANNULLO I MOTI RELATIVI TRA CORPO 1 e 2

(STABILISCE LA PERFETTA CONTINUITÀ MATERIALE)

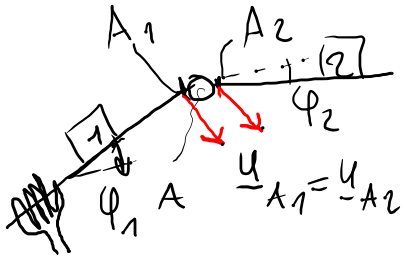


REAZ. VINCOLARI
M, V, H (3 INDIPENDENTI)

– CERNIERA INTERNA $(\nu = 2)$

PREST. CINEM.

PREST. STATICA

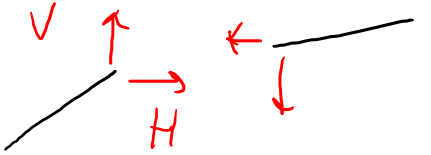


$$\underline{u}_{A_1} = \underline{u}_{A_2}$$

NO SPOST. RELATIVI

$\Delta\varphi \neq 0$ (ROTAZIONE RELATIVA LIBERA)

$\varphi_2 - \varphi_1 \neq 0$

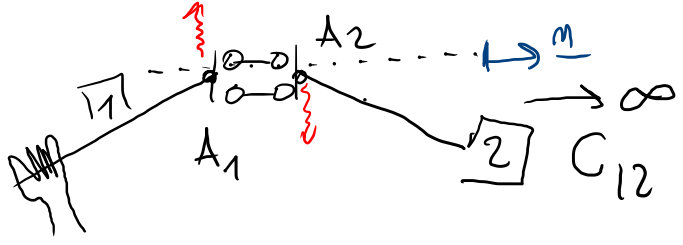


REAZ. VINCOLARI

$\exists$ un CENTRO DI ISTANTANEA ROTAZ. RELATIVA : C_{12}

$$C_{12} = A$$

– DOPPIO PENDOLO INTERNO $(\nu = 2)$



$$\begin{bmatrix} \underline{u}_{A_1} \cdot \underline{m} = \underline{u}_{A_2} \cdot \underline{m} \\ \varphi_1 = \varphi_2 \end{bmatrix}$$