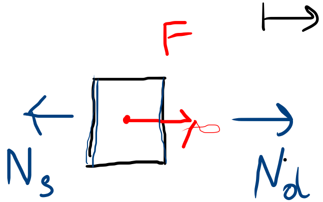
DISCONTINUITÀ NEI DIAGRAMMI (N, T, M)

16/5/22

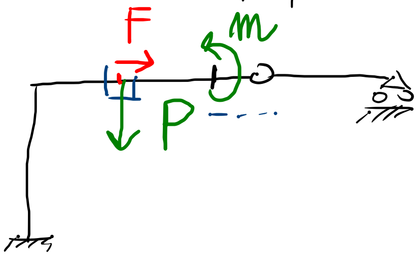
N:

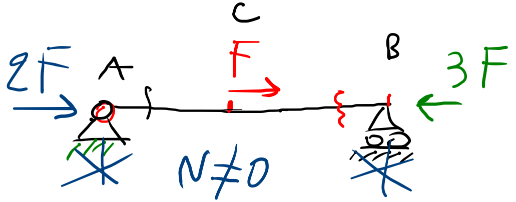


$\Delta N = N_d - N_s$: SALTO DI N

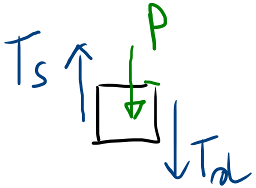
$\overset{+}{\mapsto}$: $\boxed{-N_s + F + N_d = 0}$

$\Delta N = -F$





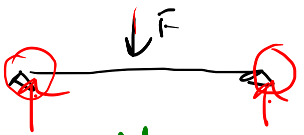
T:

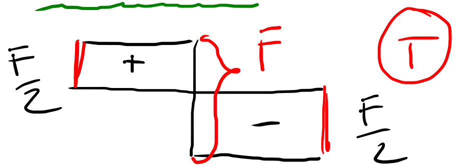


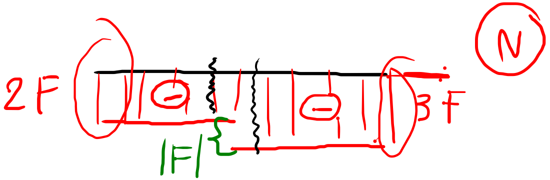
$+\downarrow$: $\boxed{-T_s + P + T_d = 0}$

$\Delta T = T_d - T_s$

$\Delta T = -P$







$N_s^C = -2F$; $N_d^C = -3F$

$\Delta N = N_d^C - N_s^C = -3F - (-2F) = -F$

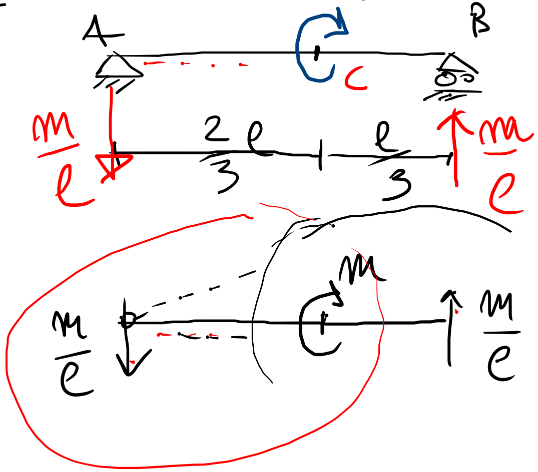
M:

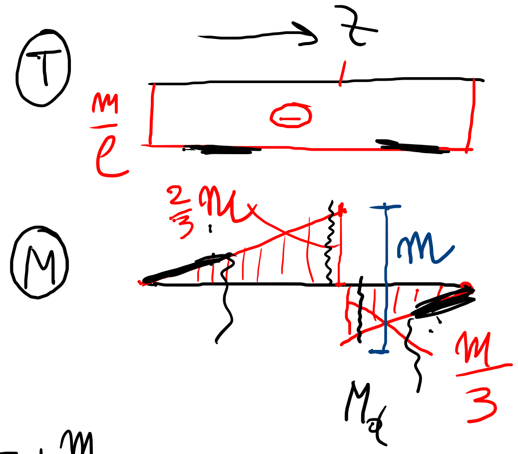
$+\circlearrowleft$: $-M_s + \mathcal{M} + M_d = 0$

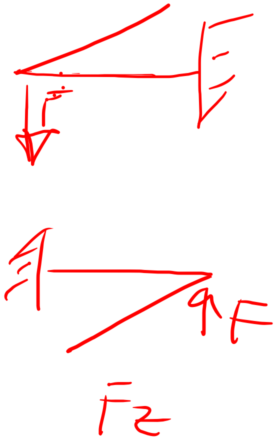
$M_d - M_s = -\mathcal{M}$

$\Delta M = -\mathcal{M}$

LES





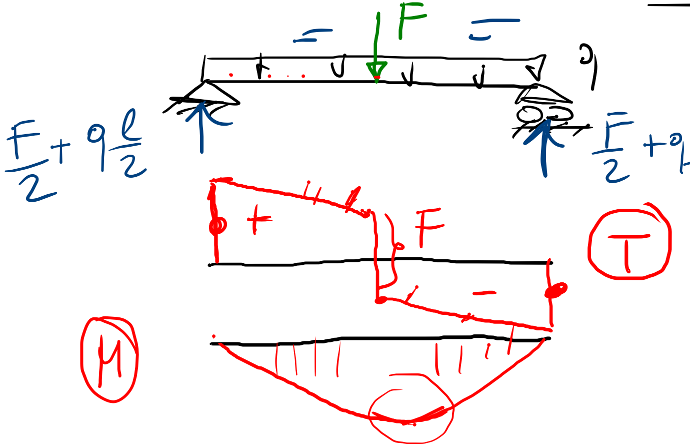


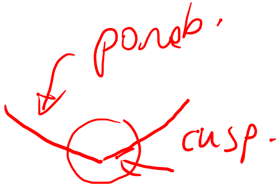
$M_d = +\frac{\mathcal{M}}{3}$

$M_s = -\frac{2}{3}\mathcal{M}$

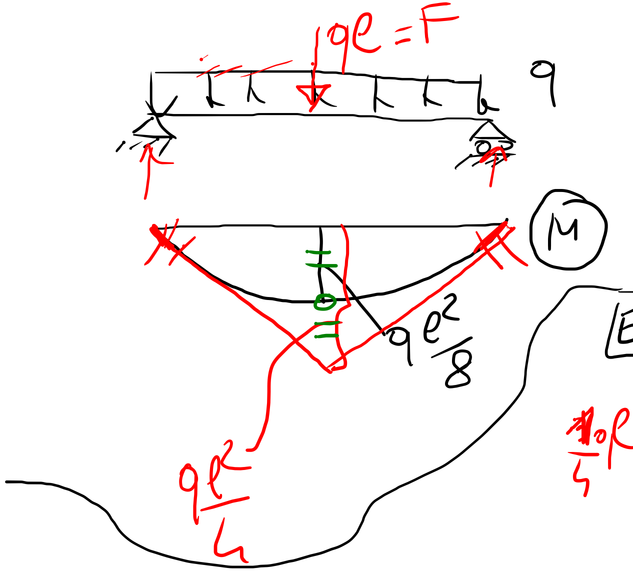
$$\boxed{\Delta M = M_d - M_s = +\mathcal{M}}$$

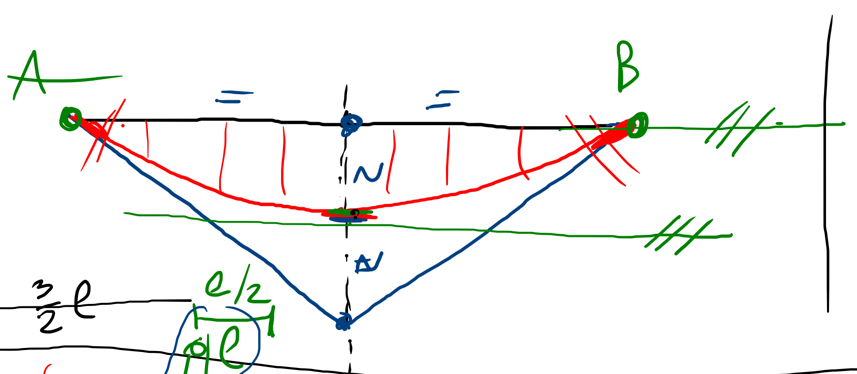
$\frac{dM}{dz} = T(z)$ I Momenti $M(z)$ sono paralleli

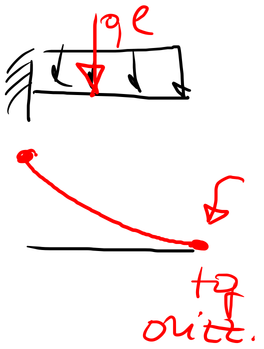




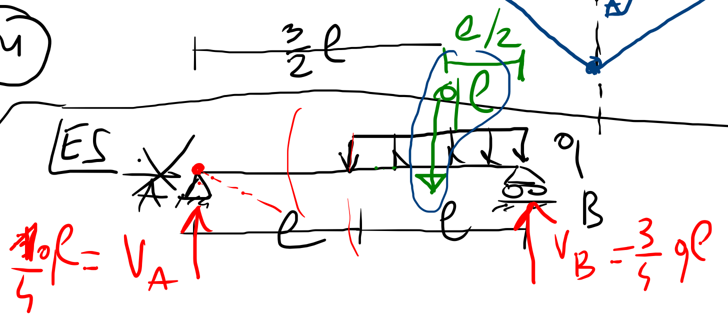
TRACCIAM. PARABOLA





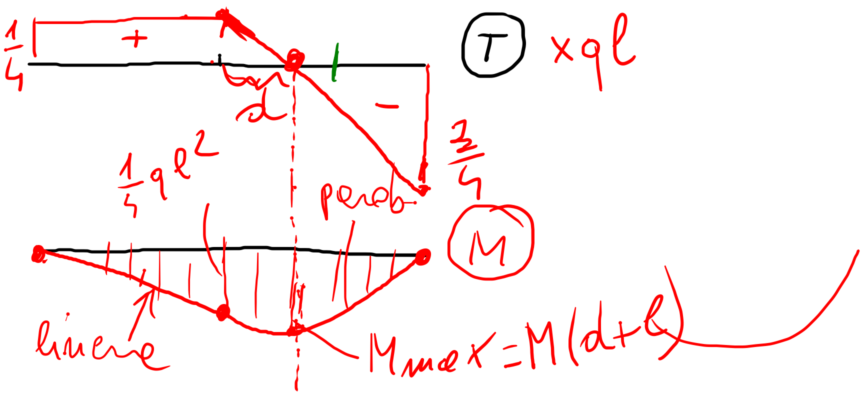


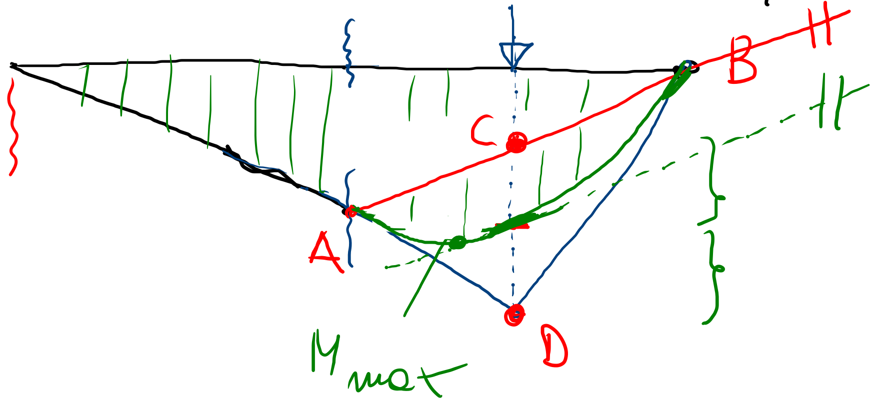
ES



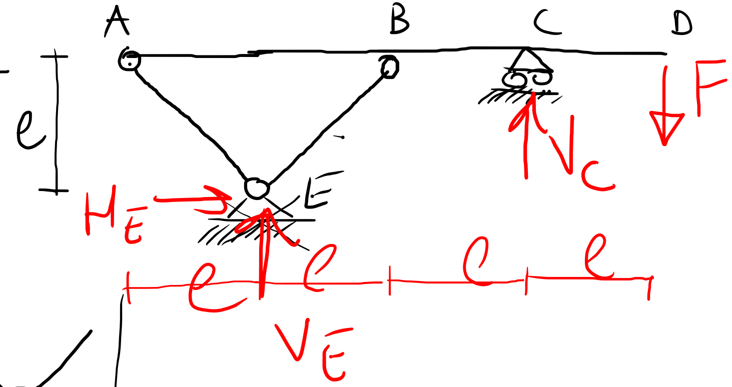
A↺ : $-q\ell\cdot\frac{3}{2}\ell + V_B\,2\ell = 0$

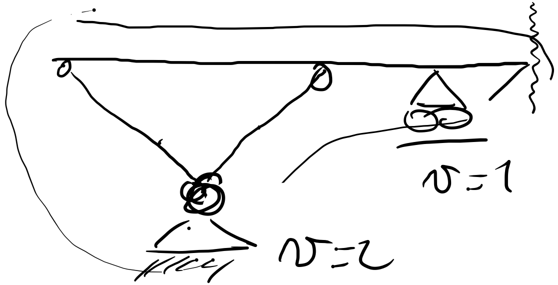
$V_B = q\ell\,\frac{3}{4}$; $V_A = \frac{1}{4}q\ell$





ES

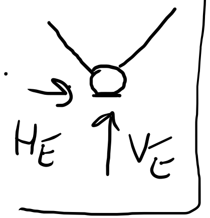




$g=3$

C.R. UNICO.

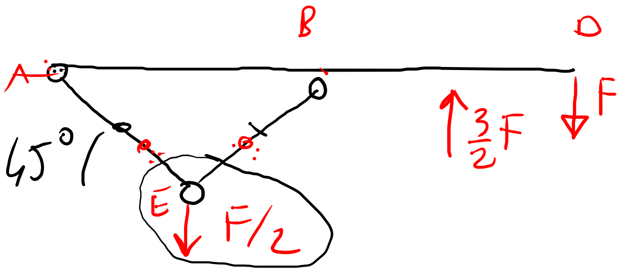
$$\begin{cases} V_C = \frac{3}{2}F \\ V_E = F - \frac{3}{2}F = -\frac{1}{2}F \end{cases}$$

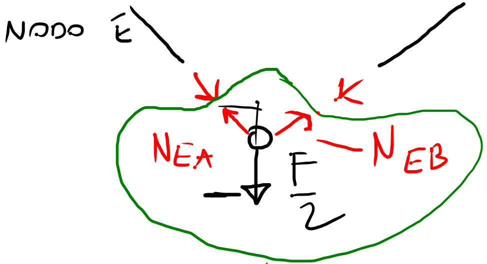


$\xrightarrow{+}$: $H_E = 0$

$+\uparrow$: $V_E + V_C - F = 0$

$+E\circlearrowleft$: $V_C 2\cancel{\ell} - F3\cancel{\ell} = 0$





$+\uparrow$: $+\frac{N_{EA}}{\sqrt{2}} + \frac{N_{EB}}{\sqrt{2}} - \frac{F}{2} = 0$

$\xrightarrow{+}$: $-\frac{N_{EA}}{\cancel{\sqrt{2}}} + \frac{N_{EB}}{\cancel{\sqrt{2}}} = 0$

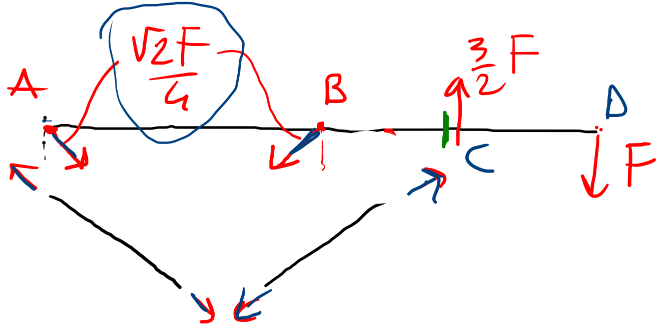
$\left. N_{EA} = N_{EB} \right]$

$$\boxed{\frac{2N_{EB}}{\sqrt{2}} = \frac{F}{2} \Rightarrow N_{EB} = +\frac{\sqrt{2}F}{4}}$$

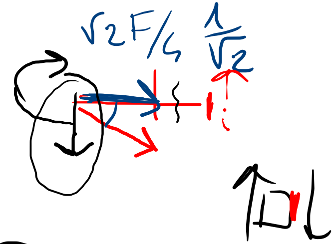
TRAZIONE

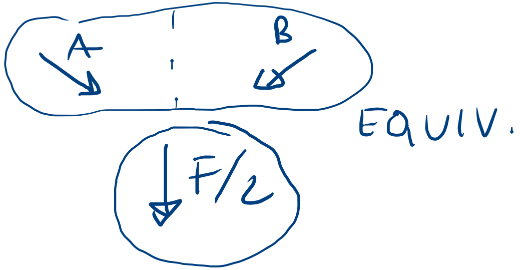
TIE-ROD | STRUT (PUNTONE)

EA, EB: TIRANTI

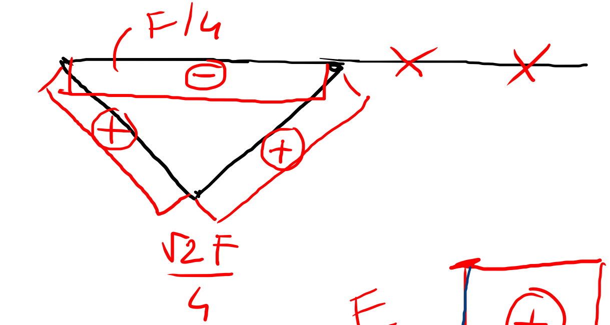


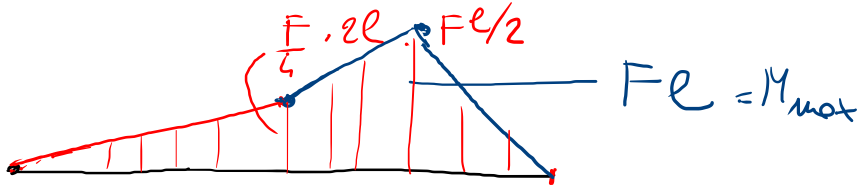
SI PUÒ VERIFICARE CHE ABCD SIA IN EQUILIBRIO.

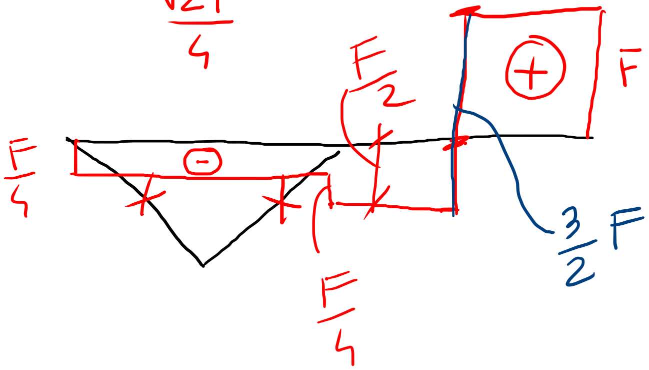




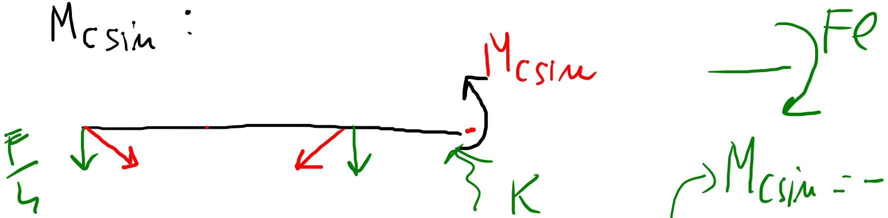
DISEGNO DIAGRAMMI







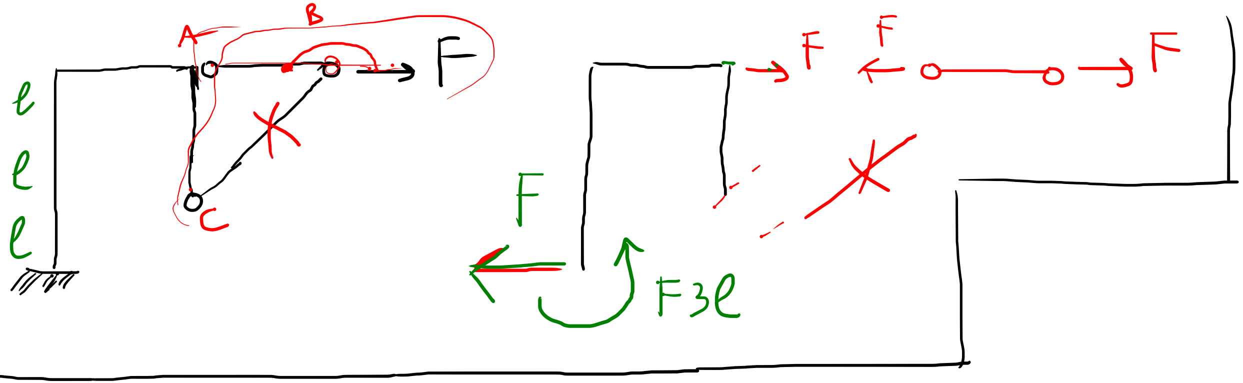
M_{csin} :



$K↺ : \frac{F}{4} 3l + \frac{F}{4} l + M_{csin} = 0$

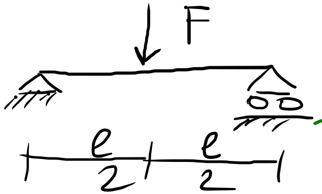
$M_{csin} = -Fl$

ES



$\underline{F} \cdot \underline{ds}$

APPLICAZ. DEL PRINCIPIO DEI LAVORI VIRTUALI (P.L.V.)

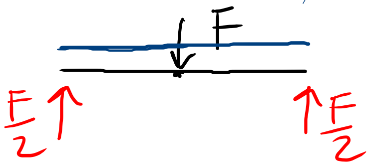


EQUILIBRIO DI UNA STR. ISOSTATICA

$\delta\eta$: TRASLAZIONE VIRTUALE

$\delta \ldots$

IN GENERALE, UNO SPOSTAMENTO VIRTUALE È UNA ROTOTRASLAZ. INFINITESIMA COMPATIBILE CON I VINCOLI DEL SISTEMA.



S.C.L.

$\uparrow \delta\eta$

LAVORO VIRTUALE: LAVORO DELLE FORZE DEL SISTEMA "PER" GLI SPOST. VIRTUALI (δL)

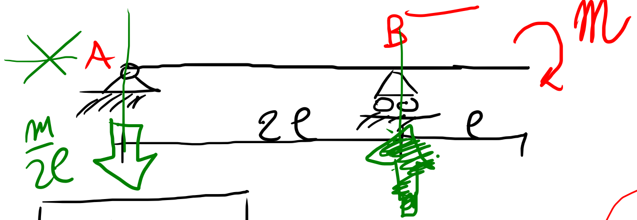
$$\boxed{\delta L = \frac{F}{2}\delta\eta + \frac{F}{2}\delta\eta - F\delta\eta = 0}$$

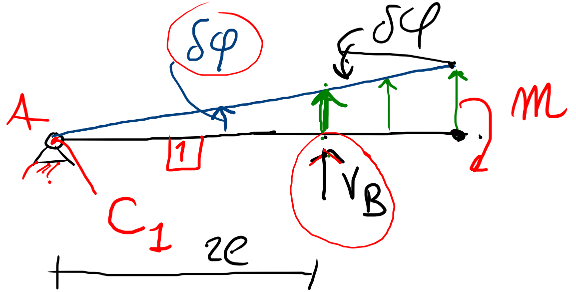
EQUILIBRIO STRUTTURA $\Longleftrightarrow$ VALE IL P.L.V.

$\delta L = 0$ $\longrightarrow$ 1 EQUAZ. SCALARE

$\Leftarrow$: USO IL P.L.V. PER CALCOLARE LE REAZ. VINCOLARI (IN ALTERNATIVA ALLE EQ. CARD. STATICA)

APPLICO IL P.L.V. (V_B?)





STR 1 VOLTA LABILE

$\boxed{\delta L = 0} \Rightarrow V_B$; $\delta L = +V_B \underbrace{\delta\varphi\, 2\ell}_{\delta u_B} - m\,\delta\varphi = 0$

$[FL]$ $[FL]$ DIMENS DEL LAVORO

$\delta L = m\,\underbrace{\delta\theta}_{\text{ROTAZ DEL CORPO}}$

$L_{ev.} = F L$

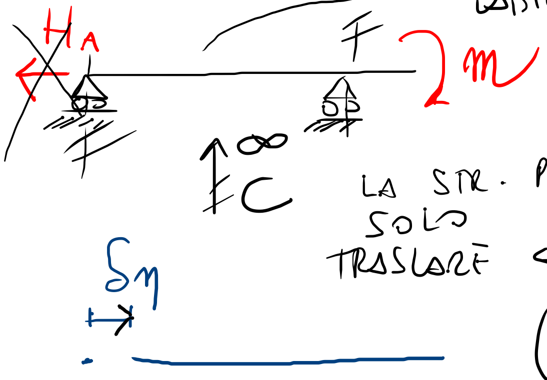
$m = FL\,(-)$

$V_B \cancel{\delta\varphi}\, 2\ell - m\, \cancel{\delta\varphi} = 0$

$\boxed{V_B = +\frac{m}{2\ell}}$ $V_B > 0$; $\uparrow \frac{m}{2\ell} = V_B$

H_A CON IL PLV

1 VOLTA LABILE



LA STR. PUÒ SOLO TRASLARE $\leftrightarrow$

(ROT NULLA)

$$\delta L = 0 \Rightarrow H_A$$

$$\delta L = -H_A\,\delta\eta + M \cdot \phi = 0$$

$$-H_A\,\delta\eta = 0$$

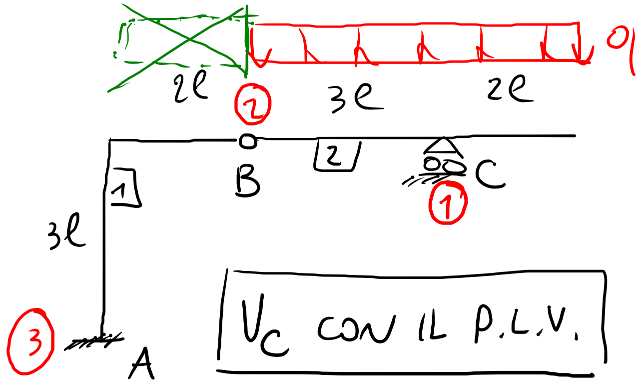
$$\boxed{H_A = 0}$$

VALE PER OGNI SCELTA DI $\delta\eta$ $(\forall \delta\eta)$

$l = 1$: STR 1 VOLTA LABILE $\Rightarrow$ CINEMATISMO o MECCANISMO.

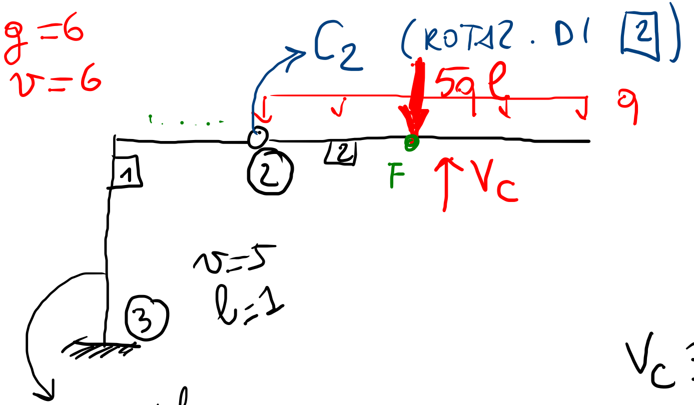
I PARAMETRI $\delta\eta$, $\delta\varphi$ CHE DESCRIVEVANO UNIVOCAMENTE IL CINEMATISMO SONO CHIAMATI "PARAMETRI LAGRANGIANI".

CON LE EQ. DI EQUIL. RISOLVO PRIMA $\boxed{2}$, POI ATTRAVERSO LA REAZ DELLA CERN. IN B RISOLVO $\boxed{1}$.

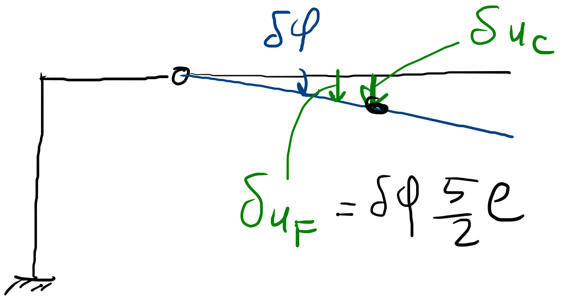


V_C CON IL P.L.V.

$g = 6$
$v = 6$



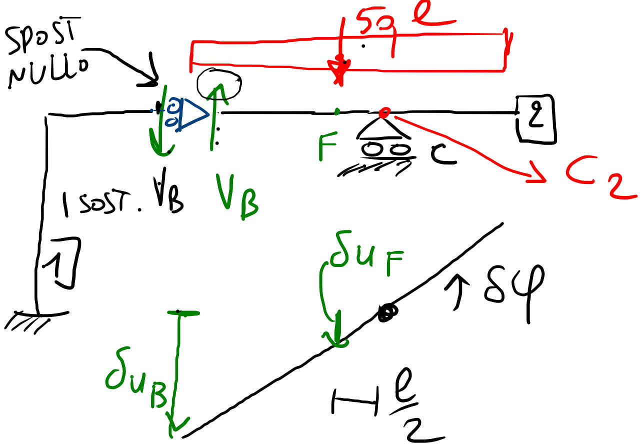
mensola (ISO) (BLOCCATA)



$$\delta L = 0 : +5q\ell \cdot \cancel{\delta\varphi}\frac{5}{2}\cancel{\ell} - V_C \cancel{\delta\varphi}\, 3\cancel{\ell} = 0, \quad \forall \delta\varphi$$

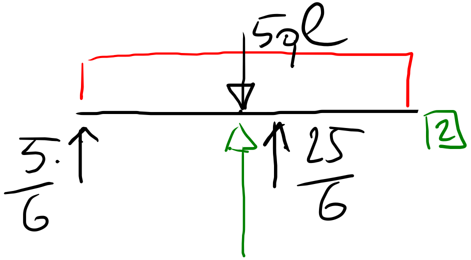
$$V_C\, 3 = \frac{25}{2} q\ell \Rightarrow V_C = +\frac{25}{6} q\ell$$

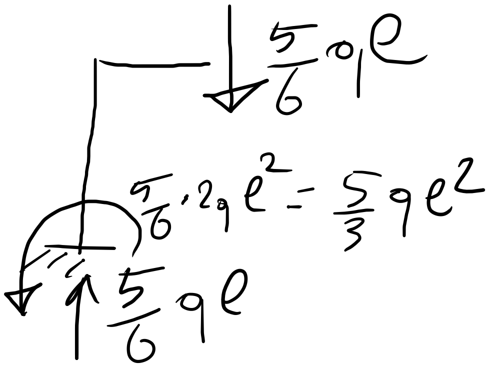
V_B CON IL PLV



$$\delta L = 0 \; ; \quad + 5ql \cdot \cancel{\delta\varphi} \frac{\cancel{l}}{2} - V_B \, 3 \cancel{l} \cancel{\delta\varphi} = 0 \, , \forall \delta\varphi$$

$$V_B 3 = \frac{5}{2} ql \Rightarrow V_B = \frac{5}{6} ql \quad (+) \downarrow \uparrow$$





EQUILIBRIO