... ANALISI STATICA

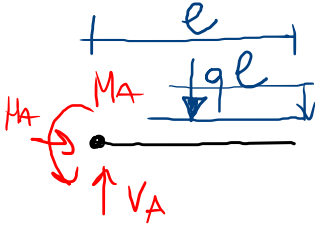
TRAVE APPOGGIATA

8/11/22

MENSOLA (CANTILEVER)

$g = \delta = v = 3$

ISOST.

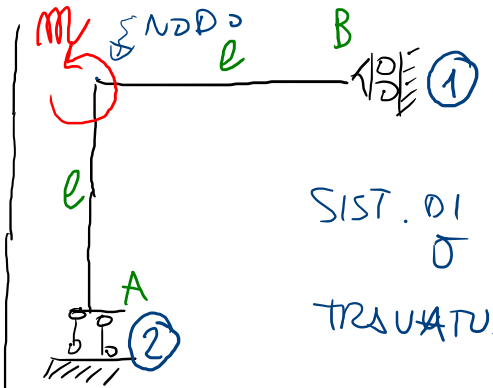


$$\rightarrow : +H_A = 0$$

$$\uparrow : +V_A - q\ell = 0$$

$$+\circlearrowleft_A : +M_A - q\ell \cdot \frac{\ell}{2} = 0$$

$$\Rightarrow \begin{cases} H_A = 0 \\ V_A = q\ell \\ M_A = q\frac{\ell^2}{2} \end{cases}$$

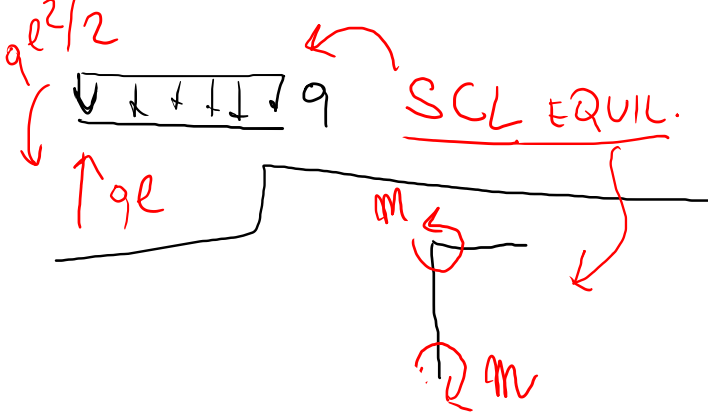


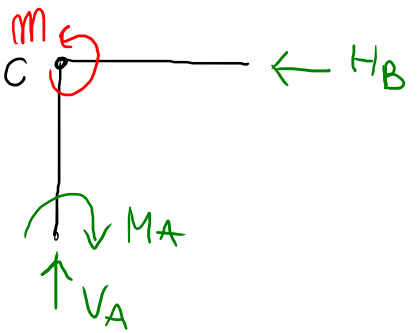
$v = 3$
$g = 3$
$\delta = 3$

SIST. DI 2 TRAVI

O

TRAVATURE





$$\rightarrow : -H_B = 0$$

$$\uparrow : +V_A = 0$$

$$+\circlearrowleft_C : -M_A + m = 0$$

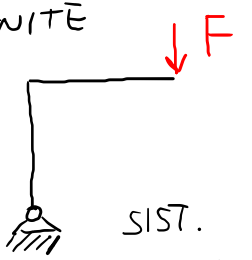
$$\Rightarrow \begin{cases} H_B = 0 \\ V_A = 0 \\ M_A = +m \end{cases}$$

CLASSIFICAZ. DEI PROBL. STATICI

g : N° DI EQUAZ. INDIP.

v : N° DI INCOGNITE

— STATICAMENTE IMPOSSIBILE : IL SIST. DELLE EQUAZ. DI BILANCIO (EQUILIBRIO) NON HA SOLUZ.



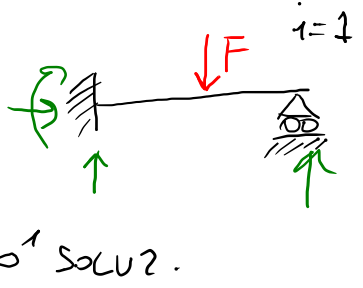
NON HANNO SOLUZIONE

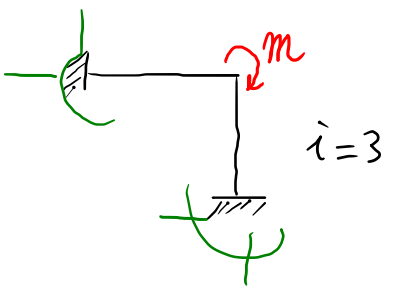
— STATICAMENTE DETERMINATI : " " " " " "

HA SOLUZ. UNICA (come gli esempi della pagina precedente)

— STATICAM. INDETERMINATO

" " " " " " HA INFINITE SOLUZ.

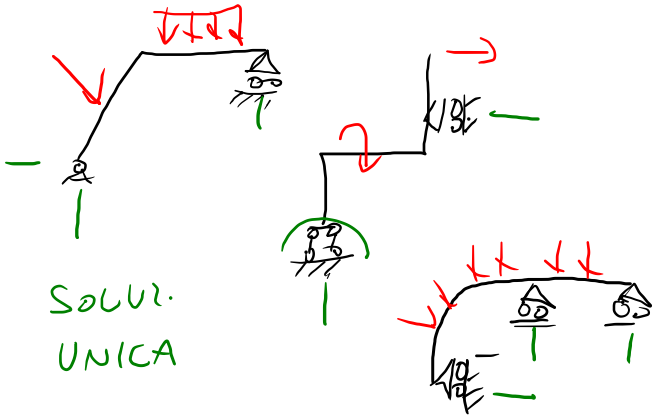




∞^3 SOLUZ.

Relazioni tra P.S. e STRUTTURE

STR ISOSTATICA ⟹ PR. STAT. È STATICAM. DETERMINATO

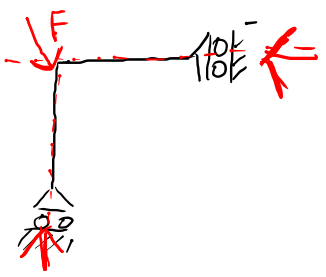


SOLUZ. UNICA

STR. IPERSTATICA ⟹ PR. STAT. È STATICAM. INDETERMINATO

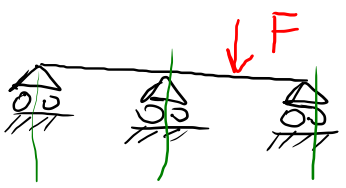
(VEDI PAG. PREC.)

STR. LABILI :



PR STATIC DET.

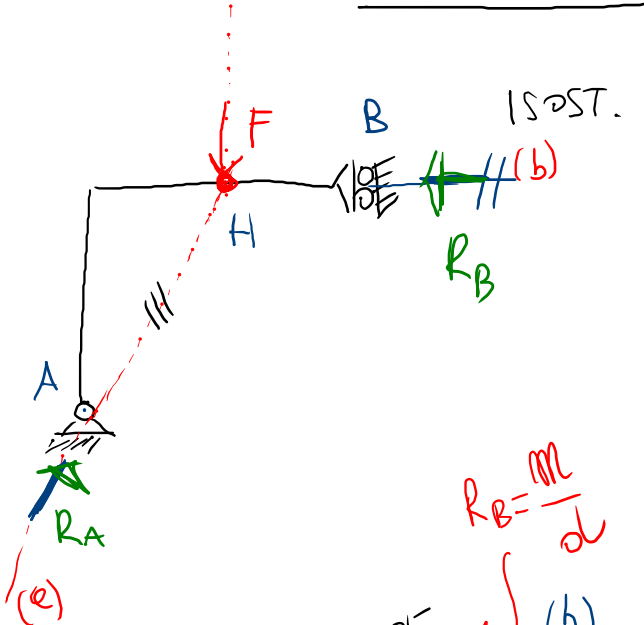
$r = 3 = 2$

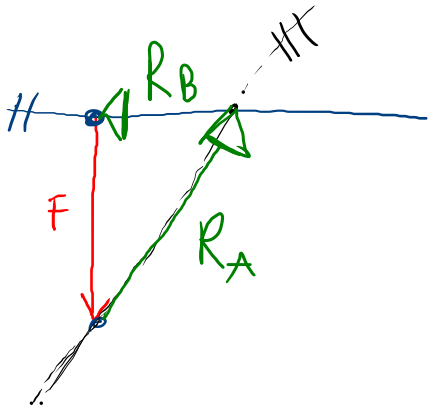


PR. STATIC. IND.

∞^1 SOLUZ.

SOLUZ. GRAFICA DI STR. ISO STATICHE (AVREI DOVUTO SCRIVERE: SOLUZ. GRAFICA DI PROBL. STATICI STATIC. DETERMINATI)





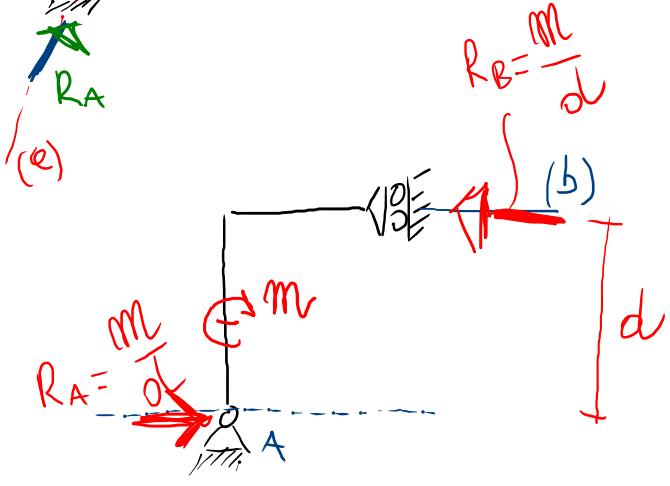
IN SCALA MISURO R_A e R_B

SIST. 3 FORZE IN EQUIL. SE
- LE FORZE SI INCONTR. IN UN PTO. (H)
- "CHIUDONO" DELLE FORZE (IL TRIANGOLO)

$M=0$

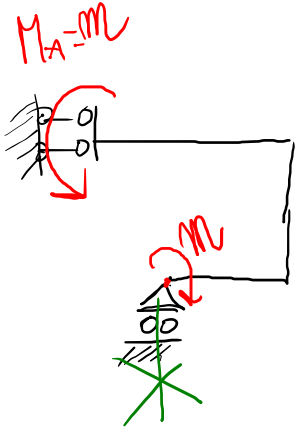
$RIS=0$

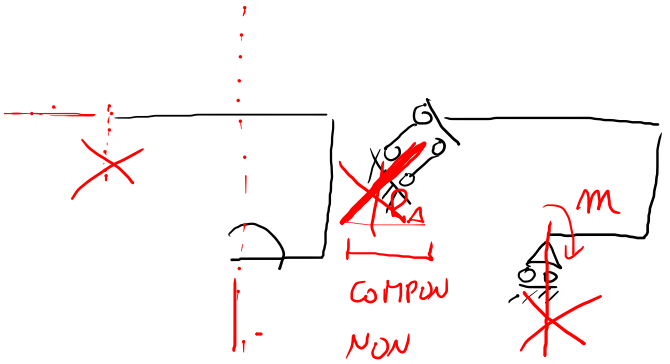
$\{F, R_A, R_B\}$ SIST. NULLO

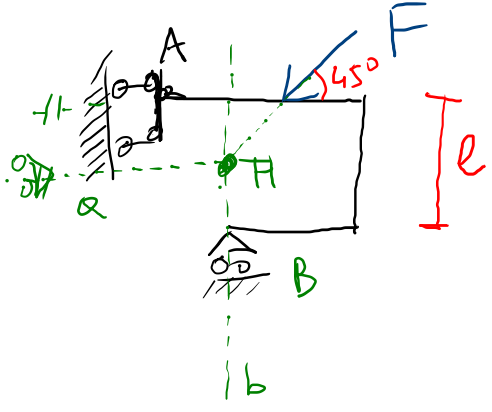


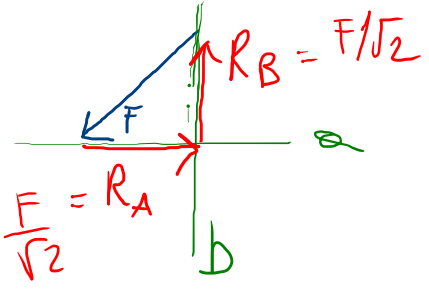
$\{M, R_B, R_A\}$ SIST. NULLO

CONSIDERIAMO UN CARICO "ALLA VOLTA"
NEL CASO DI PIÙ CARICHI APPLICATI.
OPPURE, UTILIZZ. LA "RISULTANTE"
DI TUTTI I CARICHI

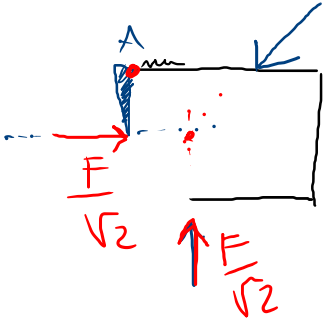


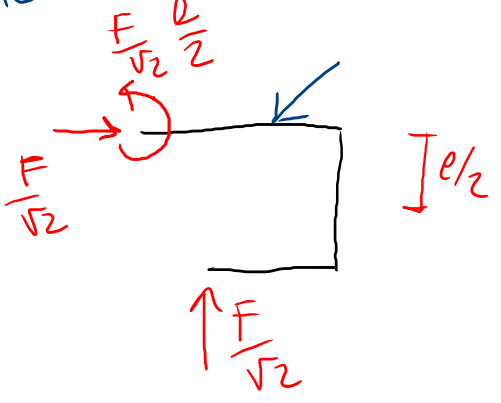


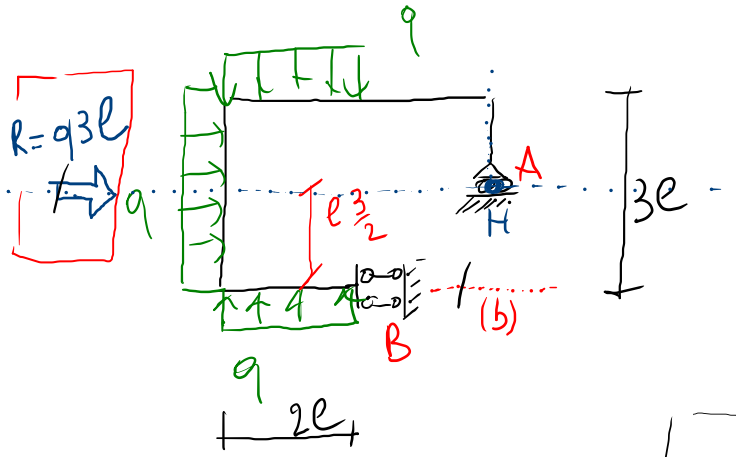


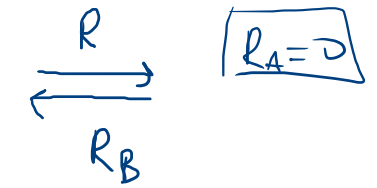


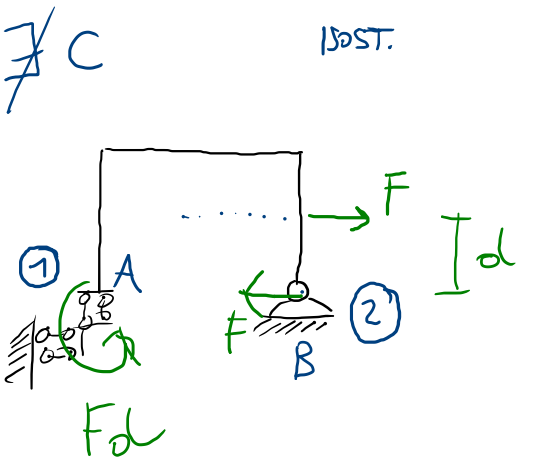
UN POSSIBILE
S.C.L. EQUIL.

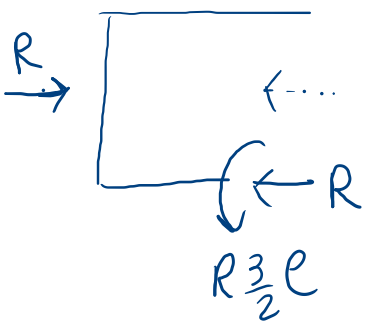


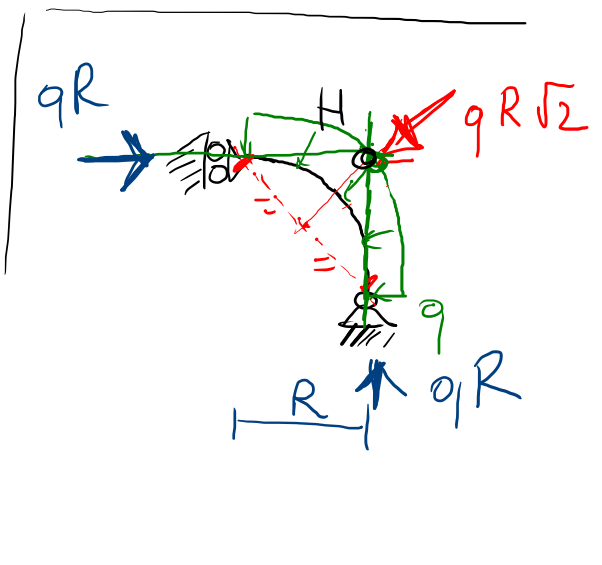



q
R=q3ℓ
q
A
H
3ℓ
ℓ 3/2
B
(b)
q
2ℓ


R
R_B
R_A=0

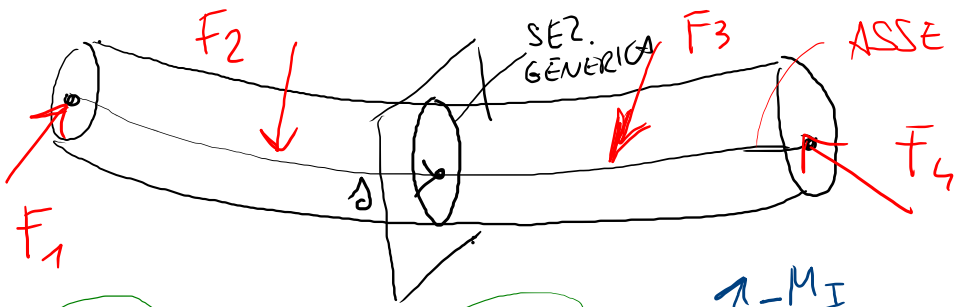

≠ C
1 GST.
F
d
1
A
F
B
2
Fd

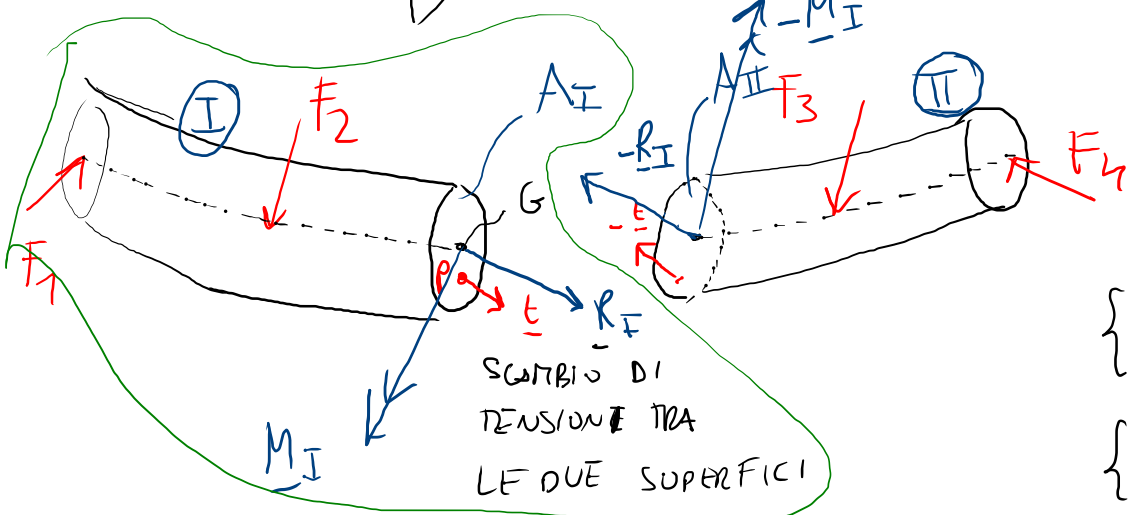

R
R
R 3/2 ℓ


qR
H
qR√2
q
R
qR

CARATTERISTICHE DELLA SOLLECITAZIONE (INTERNA DELLE TRAVI) (CDS)
(AZIONI INTERNE)

PARTIAMO DALLO S.C.L. EQUILIBRATO DI UNA TRAVE





$\{F_1, F_2, F_3, F_4\}$ SIST. NULLO

IN EQUILIBRIO

$$\underline{R}_I = \int_{A_I} \underline{t}\, dS \quad ; \quad \underline{R}_{II} = -\underline{R}_I$$

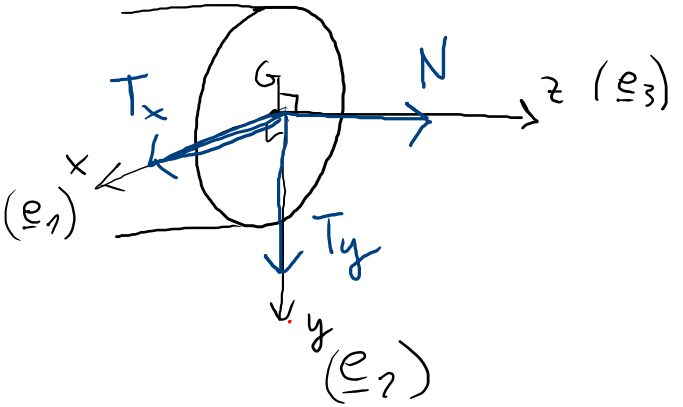
$$\underline{M}_{I(G)} = \int_{A_I} GP \times \underline{t}\, dS \quad ; \quad \underline{M}_{II} = -\underline{M}_I$$

IL REQUISITO CHE (I) SIA BILANCIATO È CHE:

$\{\underline{F}_1, F_2, R_I, M_I\}$ SIST. NULLO

$\{F_3, F_4, -R_I, -M_I\}$ SIST. NULLO

AI (x,y): ASSI PRINCIPALI $\perp z$



$$\underline{R}_I = N\,\underline{e}_3 + T_x\,\underline{e}_1 + T_y\,\underline{e}_2$$

CDS

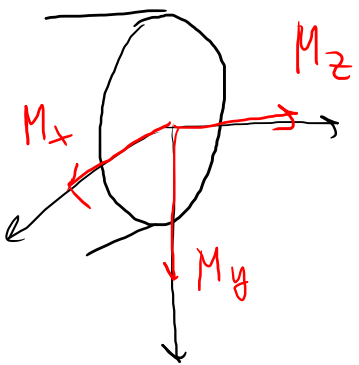
N: FORZA NORMALE (SFORZO) NORMAL FORCE

T_x, T_y: FORZE DI TAGLIO (V, Q) SHEAR FORCE

BENDING MOMENT

M_x, M_y: MOMENTI FLETTENTI

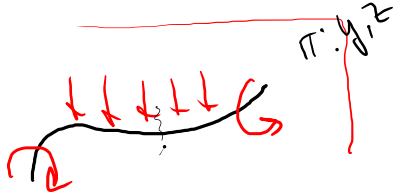
M_z: MOMENTO TORCENTE TORQUE



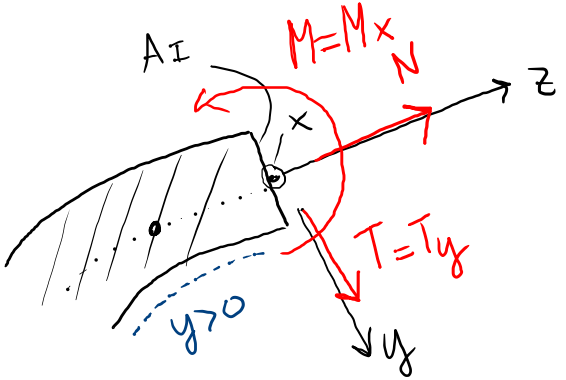
$$\underline{M}_I = M_x\,\underline{e}_1 + M_y\,\underline{e}_2 + M_z\,\underline{e}_3$$

CDS

NEL PIANO



TRAVE PIANO



N

T: TAGLIO (T_y)

M: MOMENTO FLETTENTE (M_x)

} CDS

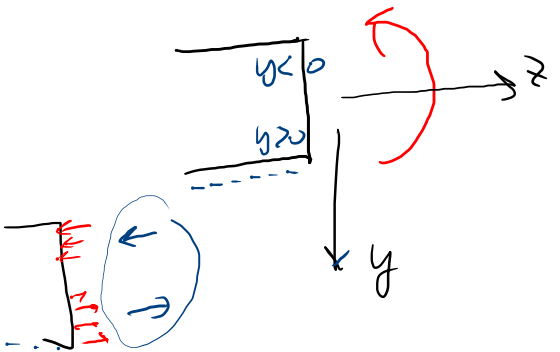
$M_z, T_x, M_y = 0$

$N > 0$: "ESCE" DALLA SEZIONE : TRAZIONE

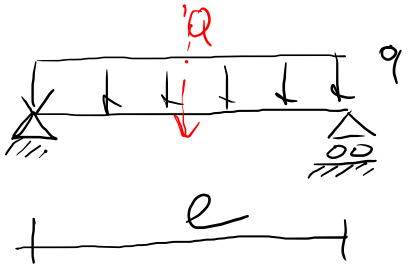
$T > 0$: "TENDE" A FAR RUOTARE LA PARTE DI TRAVE A CUI È APPLICATA IN SENSO ORARIO

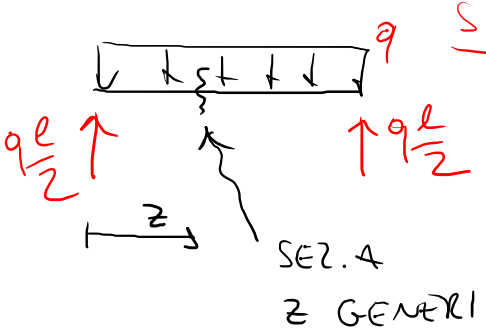
$M > 0$: "TENDE" AD ALLUNGARE EFFETTIVAMENTE LE FIBRE DELLA TRAVE A $y > 0$

(DALLA PARTE TRATTEGGIATA)



ES





SCL EQUILIBRATO

$0 < z < \ell$

$N(z)$, $T(z)$, $M(z)$