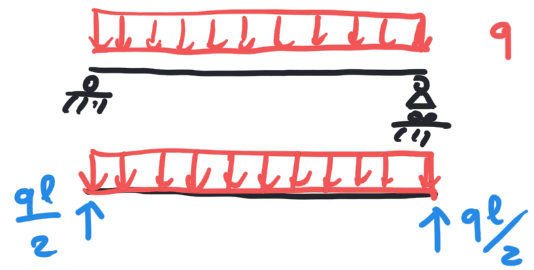
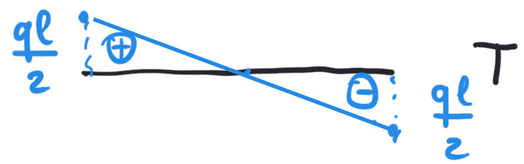
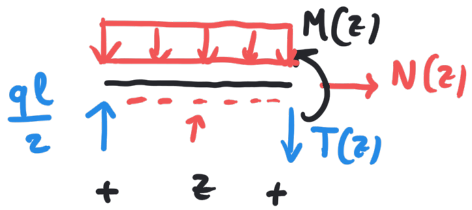
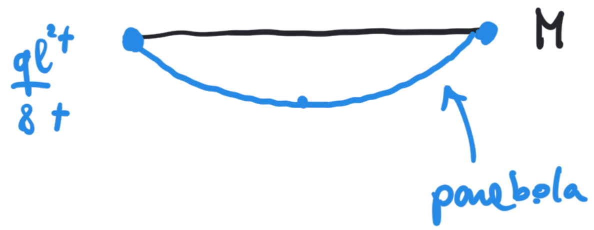
METODO DELL'EQUILIBRIO

DIAGRAMMI









$N(z) = 0$

$T(z) = q\left(\frac{l}{2} - z\right)$

$M(z) = \frac{qz}{2}(l-z)$ 2° grado

$\boxed{ql^2/8 = M_{MAX}}$ (Δ)

Trave sempl. app., carico unif. q

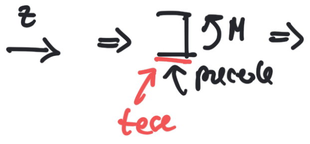
$\Rightarrow \boxed{M_{max} = ql^2/8}$ (mezzeria)

Trucco mnemonico

$[ql^2] = FL^{-1}L^2 = FL = [M]$

$1/8$

I diagrammi delle CdS <u>NON SONO</u> grafici di funzione

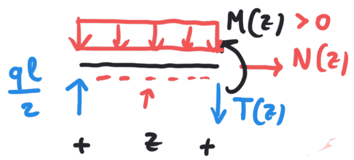


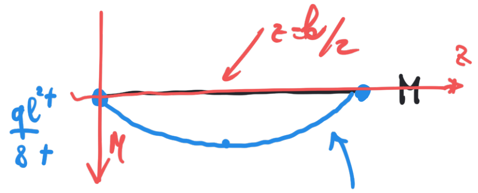
$\Rightarrow$ $M>0$ fibre inf tese.

Regola delle fibre tese per diagramma

diagramma sotto linea guida

$M>0 \Rightarrow$ diagramma sotto linea guida



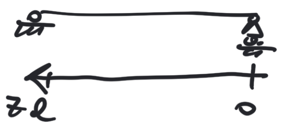


Domanda: perché il grafico ha concavità verso alto e coeff ma la espressione analitica di M ha il coefficiente di grado 2 < 0?

<0

$$M(z) = \frac{qz}{2}(l-z) = -\frac{q}{2}z^2 + \frac{ql}{2}z$$

se avessimo orientato l'asse nel verso opposto.



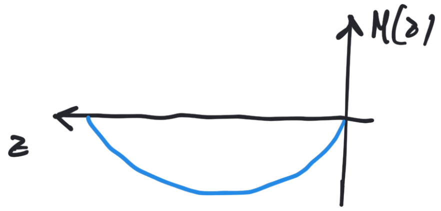
M avrebbe cambiato segno.

$$M(z) = -\frac{qz}{2}(l-z) = \frac{q}{2}z^2 - \frac{ql}{2}z$$

$M>0 \Leftrightarrow$ tese fibre sup.

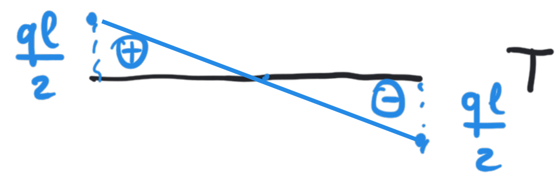
Regola fibre tese

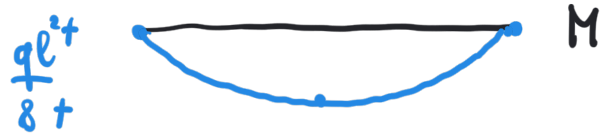
$\Rightarrow$ $M>0$ diagr. sopra linea guida.

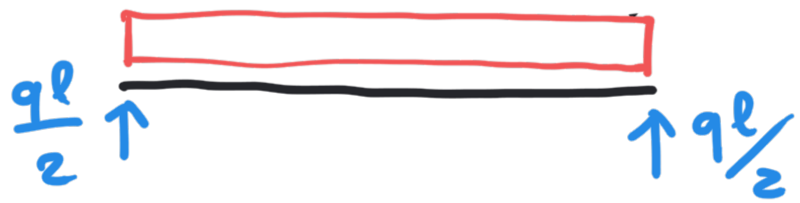


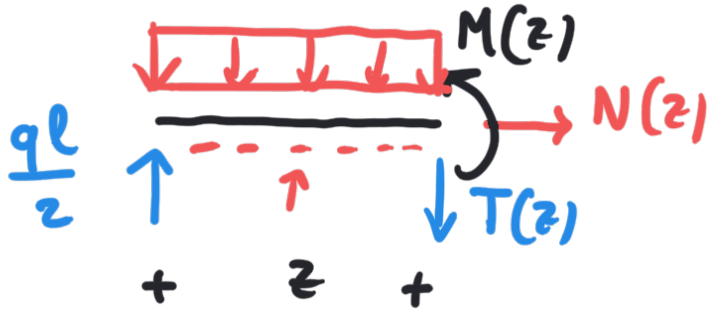
la convenzione adoperata per M non dipende da come abbiamo orientato l'asse.

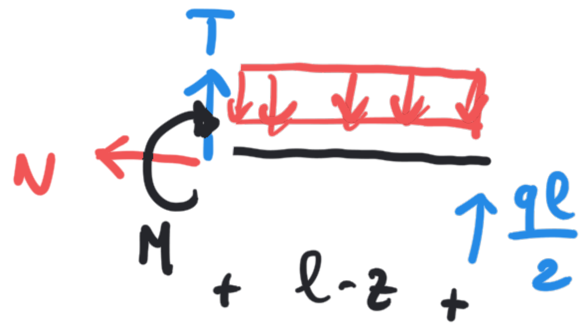
__OSSERV.__ : le CdS si possono determinare indifferentemente imponendo l'equilibrio della parte che precede o della parte che segue.











$$N(z) = 0 \quad ✓$$

$$T(z) = q\left(\frac{l}{2} - z\right) \quad ✓$$

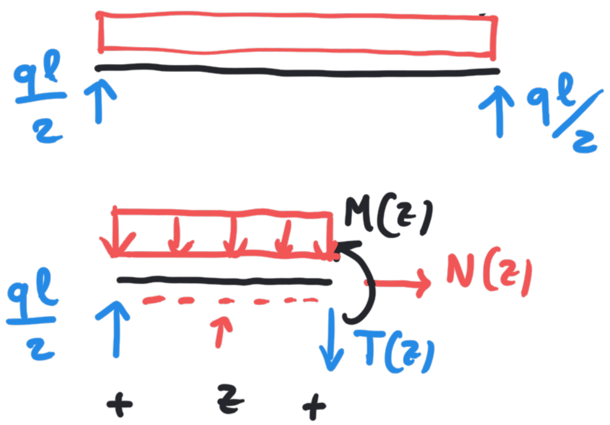
$$M(z) = \frac{qz}{2}(l - z)$$

$$T + \frac{ql}{2} - q(l - z) = 0$$

$$T = \underbrace{ql - \frac{ql}{2}}_{ql/2} - qz$$

OSS: le CdS in P si possono determinare riducendo al polo P il sistema di forze esterne applicate alla parte che precede (o segue) il punto P.

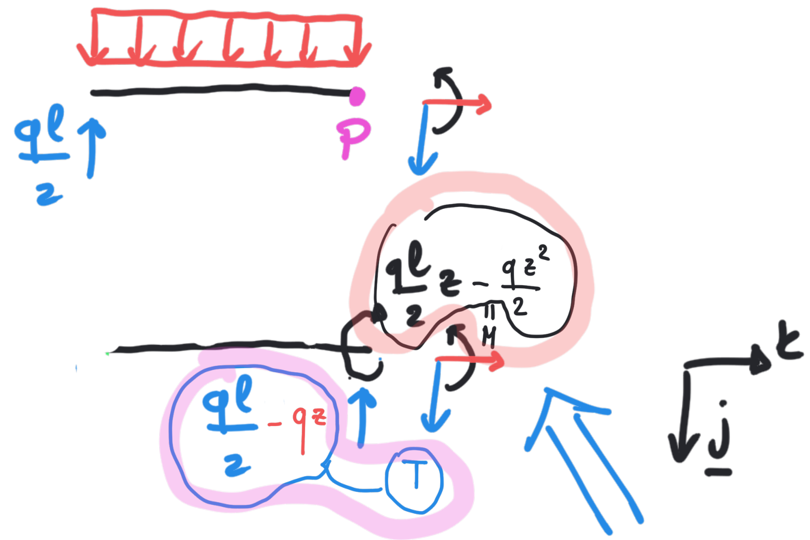
METODO DELL'EQUIVALENZA



$N(z) = 0$

$T(z) = q\left(\ell/2 - z\right)$

$M(z) = \frac{qz}{2}(\ell - z)$

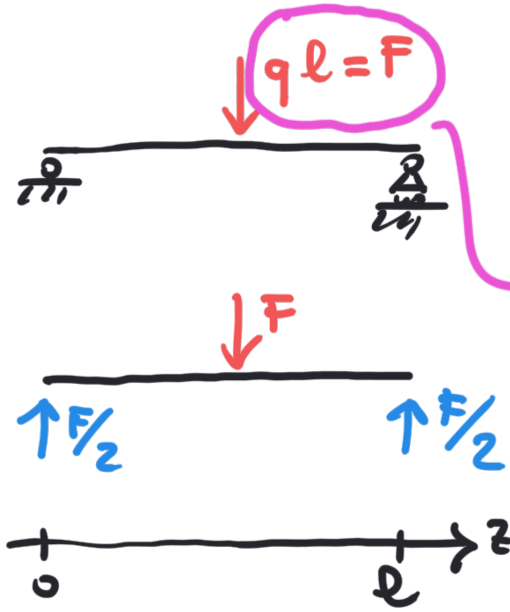


il sistema di forze che precede è equivalente a

- forza $q\left(\ell/2 - z\right)(-\underline{j})$
- coppia $\frac{q\ell}{2}(\ell - z)(-\underline{i})$

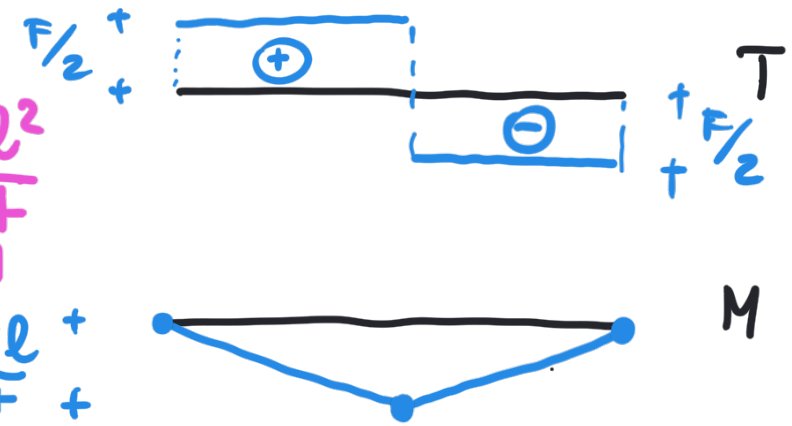
il sistema di forze che precede e' equivalente a

ESEMPIO 2



$$= \frac{q\ell^2}{8}\cdot 2 \rightarrow \text{vedi } (\Delta)$$

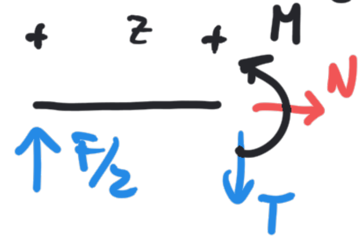
$$\frac{q\ell^2}{4} = \frac{F\ell}{4}$$



NB: concentrando il carico in mezzeria M_{max} raddoppia!

2 casi:

① $z < \ell/2$



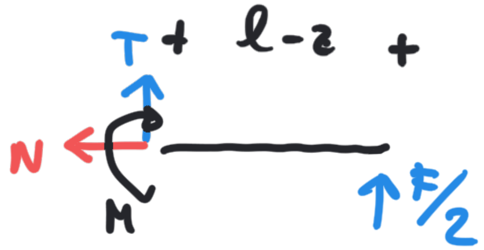
parte che precede

$N = 0$

$T = F/2$

$M = \frac{F}{2} z$

② $z > \ell/2$

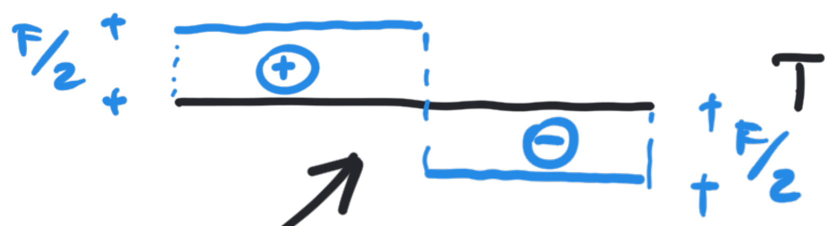


parte che segue

$N = 0$

$T = -F/2$

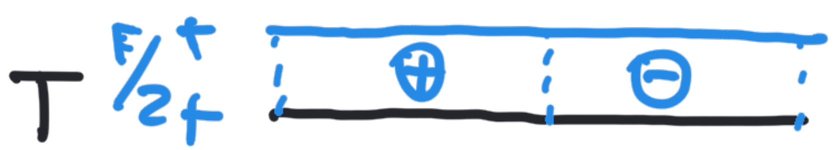
$M = \frac{F}{2}(\ell - z)$



diagr. deve evidenz.
discont.

NB: concentrando il carico nella mezzeria il momento flettente massimo raddoppia!

OSSERVAZIONE:



NO!