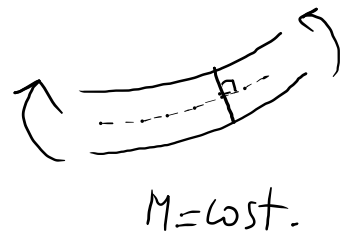
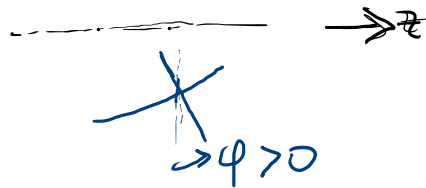


OSS. SULLA EQ LINEA EUSTICA

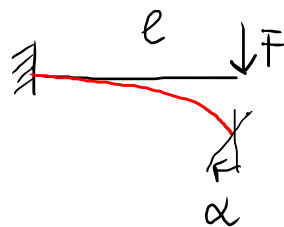
SDC, 29/11/23

$$v'(z) = -\phi(z)$$

LE SEZIONI
RUOTANO
MANTENENDO
⊥ ALL'ASSE
DEFORMATO



(TH. DI EULERO -
-BERNOULLI)



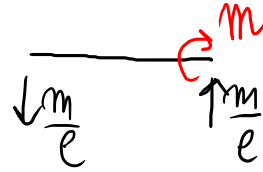
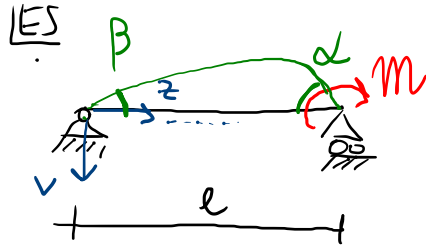
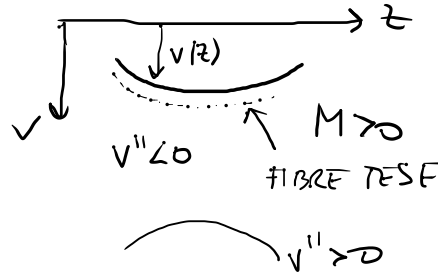
$$\frac{Fl^3}{3EI}$$

SPOST [L]

$$\therefore \alpha = \phi(l) = -\frac{Fl^2}{2EI}$$

ROTAZIONE [-]

$$v''(z) = - \frac{M(z)}{EI}$$



$$v(0) = 0 \Rightarrow C_2 = 0$$

$$v(l) = 0 \Rightarrow \frac{m}{EI} \frac{l^3}{6} + C_1 l = 0 ; C_1 = - \frac{m l}{6 EI}$$

$$\begin{cases} v''(z) = \frac{m}{EI l} z \\ v(0) = 0 \\ v(l) = 0 \end{cases}$$

$$v'(z) = \frac{m}{EI l} \frac{z^2}{2} + C_1$$

$$v(z) = \frac{m}{EI l} \frac{z^3}{6} + C_1 z + C_2$$

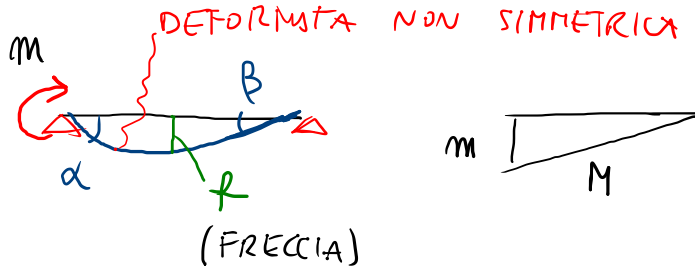
$$v(z) = \frac{m}{EI l} \frac{z^3}{6} - \frac{m l}{6 EI} z$$

$$\begin{aligned} v'(z) &= \frac{m}{2 l EI} z^2 - \frac{m l}{6 EI} \rightarrow \beta = |v'(0)| = \frac{m l}{6 EI} \\ \alpha &= |v'(l)| = \frac{m l}{EI} \frac{1}{3} \end{aligned} \quad \left. \begin{array}{l} \text{+} \\ \text{A} \\ \text{B} \\ \text{E} \\ \text{L} \\ \text{A} \end{array} \right\}$$



$$\alpha = \frac{m l}{3EI} ; \beta = \frac{m l}{6EI}$$

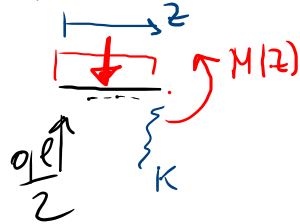
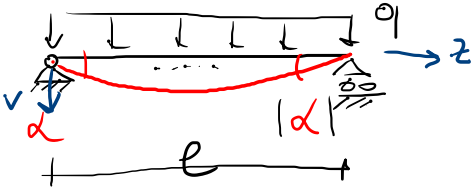
$$f = \left| v\left(\frac{l}{2}\right) \right| = \frac{m l^2}{16EI}$$



$$[\alpha] = \left[\frac{FL}{L^2} \right] = [-]$$

ADIMENS.
(RISULTATI)

$$[f] = [L]$$



$$K^+ : -q \frac{l}{2} z + q z \cdot \frac{z}{2} + M(z) = 0$$

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

$$\alpha = v'(0) = C_1 = \frac{q l^3}{24EI}$$

$$\begin{cases} v'' = -\frac{M(z)}{EI} = \frac{q}{2EI} (z^2 - lz) \\ v(0) = 0 \longrightarrow C_2 = 0 \\ v(l) = 0 \longrightarrow \frac{q}{2EI} \left(\frac{l^4}{12} - \frac{l^4}{6} \right) + C_1 l = 0 \end{cases}$$

$$\frac{q}{2EI} \left(\frac{l^4}{12} - \frac{l^4}{6} \right) + C_1 l = 0 ; C_1 = + \frac{q l^3}{24EI}$$



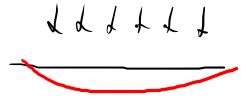
$$v'(l) = \frac{q}{2EI} \left(\frac{z^3}{3} - l \frac{z^2}{2} \right) + \frac{ql^3}{24EI}$$

$$v'(l) = \frac{q}{2EI} \left(\frac{l^3}{3} - \frac{l^3}{2} \right) + \frac{ql^3}{24EI}$$

$$= \frac{ql^3}{2EI} \left(-\frac{1}{6} \right) + \frac{ql^3}{24EI} = \left(-\frac{1}{24} - \frac{1}{12} \right) \frac{ql^3}{24EI} = -\frac{1}{24} \frac{ql^3}{24EI}$$

$$|v'(l)| = \alpha$$

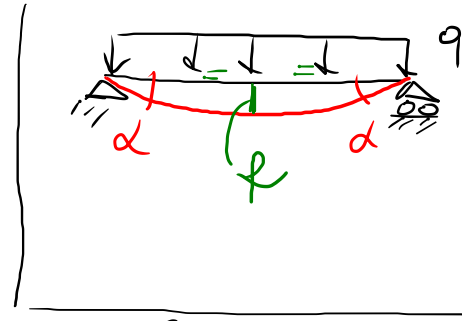
$$f = v\left(\frac{l}{2}\right) = \frac{5}{384} \frac{ql^4}{EI}$$



SAGGING



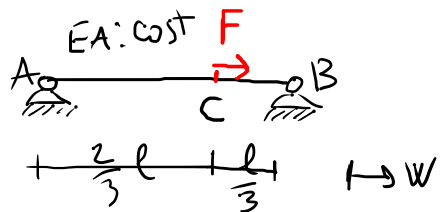
HOGGING



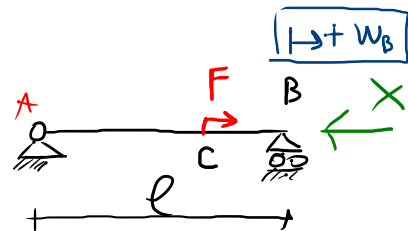
$$\alpha = \frac{ql^3}{24EI}$$

$$f = \frac{5}{384} \frac{ql^4}{EI}$$

INTRODUZIONE ALLE STRUTTURE IPERSTATICHE (METODO DELLE FORZE)



IN A e IN B gli spost. W sono NULLI ($W_A = W_B = 0$)



STR. PRINCIPALE (S.P.)

(STR. STAT. DETERMINATA
QUASI SEMPRE ISOSTATICA)



1 EQ. DI EQUILIBRIO $\rightarrow -H_A + F + H_B = 0$
UTILE

2 INCOGNITE (PROBLEMA STATICAMENTE
INDETERMINATO)

PER DETERMINARE X IMPONGO LA
CONGRUENZA (ESTERNA) NEL PUNTO B

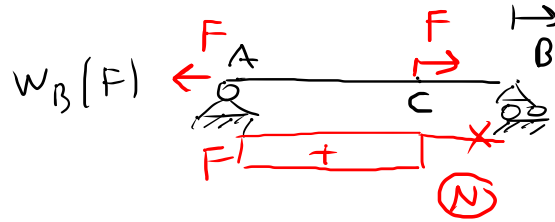
$$W_B = 0$$

EQ. DI CONGRUENZA

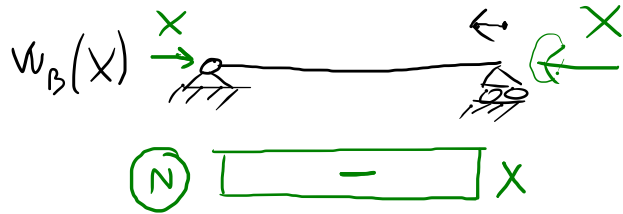
$$W_B(F, X) = 0$$

$$w_B(F, X) = w_B(F) + w_B(X)$$

$$\boxed{+ \rightarrow w_B}$$



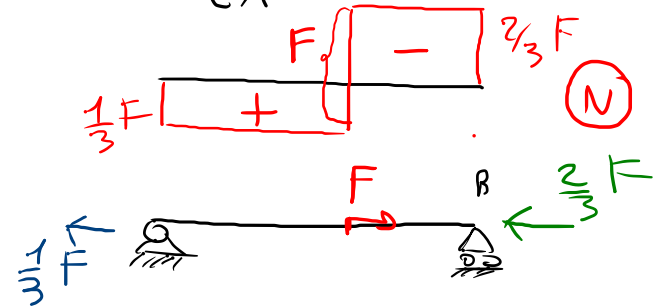
$$w_B(F) = w_C(F) = + \frac{F \frac{2}{3} l}{EA} = + \frac{2}{3} \frac{Fl}{EA}$$



$$w_B(X) = - \frac{X l}{EA}$$

$$+ \frac{2}{3} \frac{Fl}{EA} - \frac{X l}{EA} = 0 \Rightarrow \boxed{X = \frac{2}{3} F}$$

(+) CONFERMA
IL VALORE DELL'INCIGNITA X
(SCELTO ARBITRARIAMENTE)



LA SP. E' ORA EQUIVAL.
ALLA STR. IPERST.
INIZIALE

