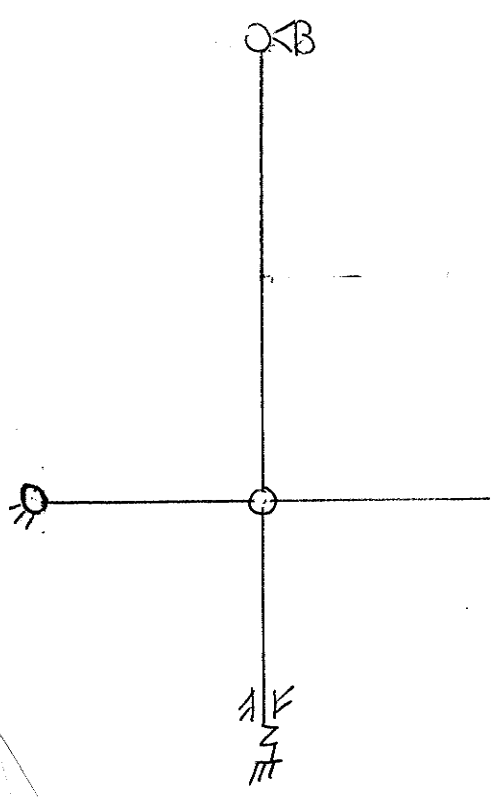


$$P_1 = 10 ql$$

$$P_2 = 52 ql$$

$$K_\eta = 38 \frac{EJ}{l^3}$$

SI VAUTA SE IL TELAIIO È A NODI FISSI O SPOSTABILI



TELAIO A NODI SPOSTABILI IN DIREZIONE $y \rightarrow$ AGGIUNGO UNA BIELLA FITTIZIA

SISTEMA RISOLVENTE

$$\begin{cases} m_{\phi\phi} \phi_c + m_{\phi\eta} \eta + m_{\phi\phi} \phi = 0 \\ H_{\eta\phi} \phi_c + H_{\eta\eta} \eta + H_{\eta\phi} \phi = 0 \end{cases}$$

CONVENZIONI DI SEGNO

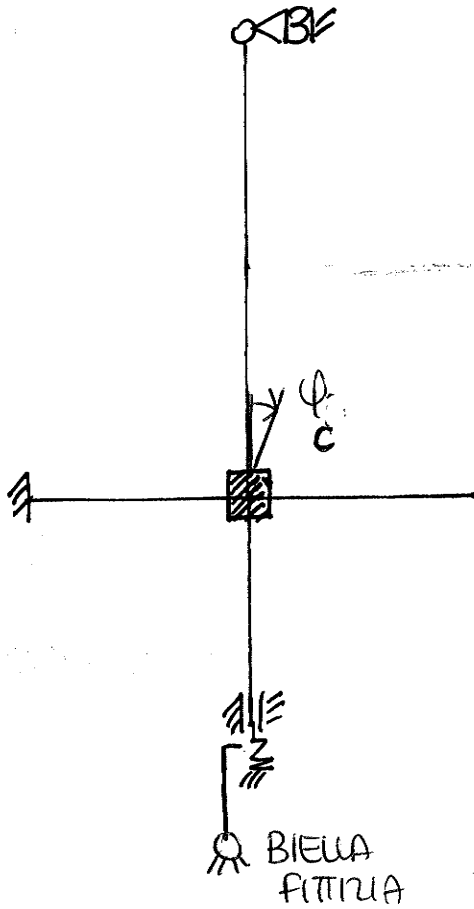


 MOMENTO
 SUL NODO

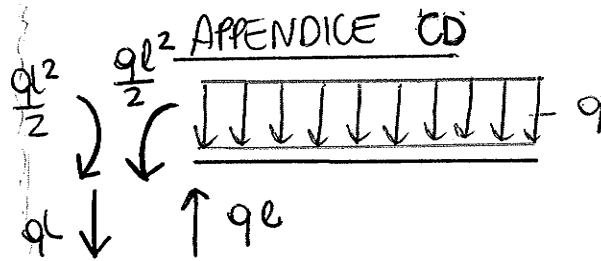
→ ⊕ ←



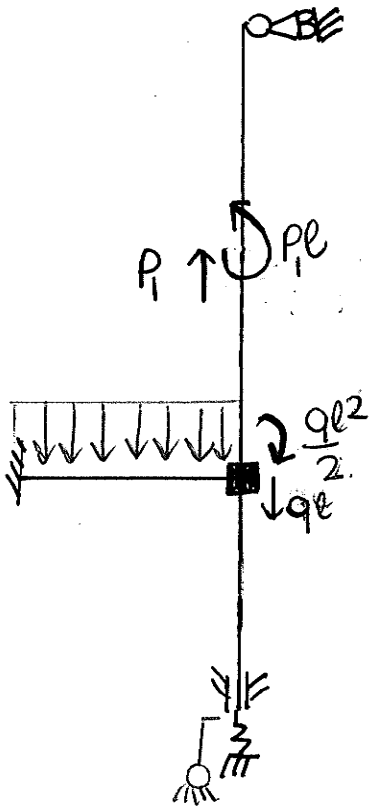
 ϕ_E



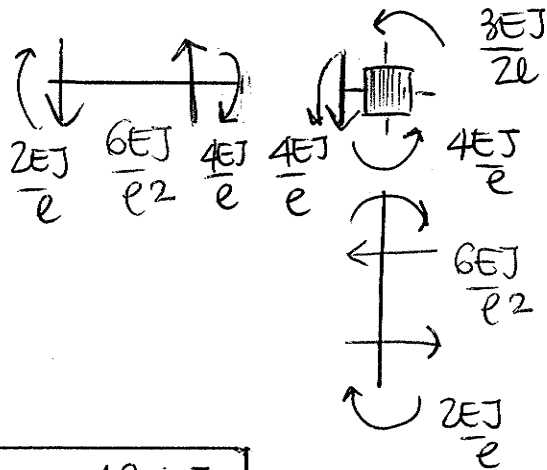
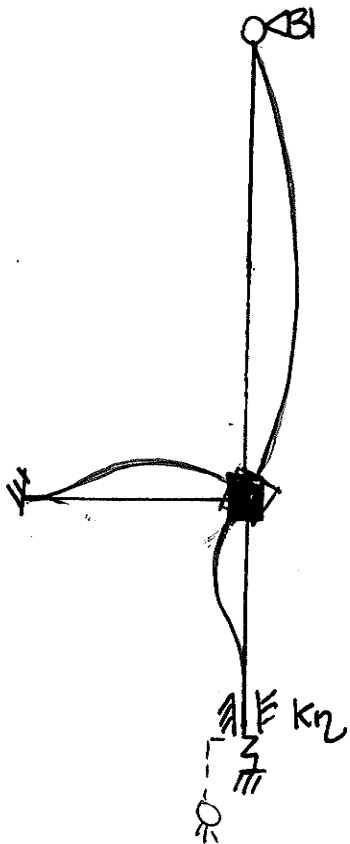
ANALISI DELL' APPENDICE ISOSTATICA



LA STRUTTURA SI SEMPLIFICA COME SEGUE:



CASO 1: $\psi_C \neq 0$; $\psi_E = 1$

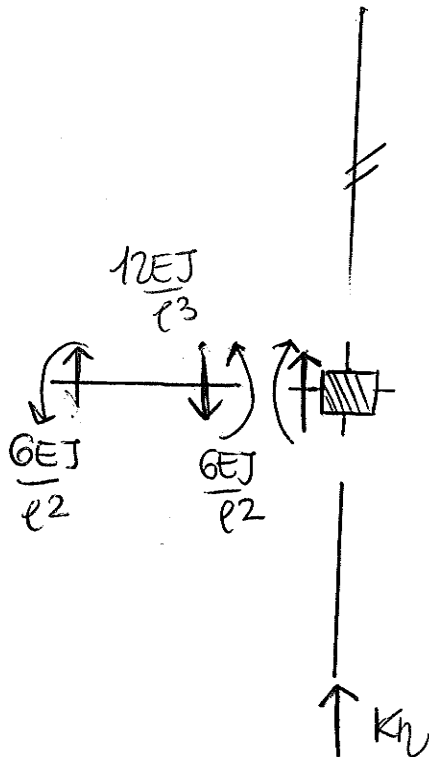
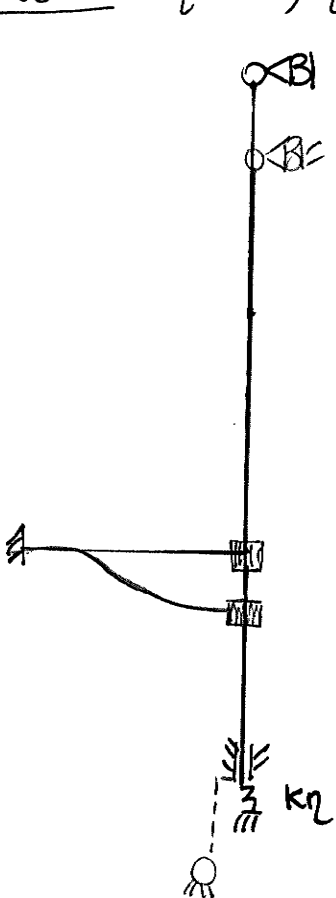


$$\frac{3EJ}{(2l)^2} = \frac{3EJ}{4l^2}$$

$$M_{CC} = \frac{4EJ}{e} + \frac{4EJ}{e} + \frac{3EJ}{2l} = \frac{19}{2} \frac{EJ}{e}$$

$$H_{\eta C} = + \frac{6EJ}{e^2}$$

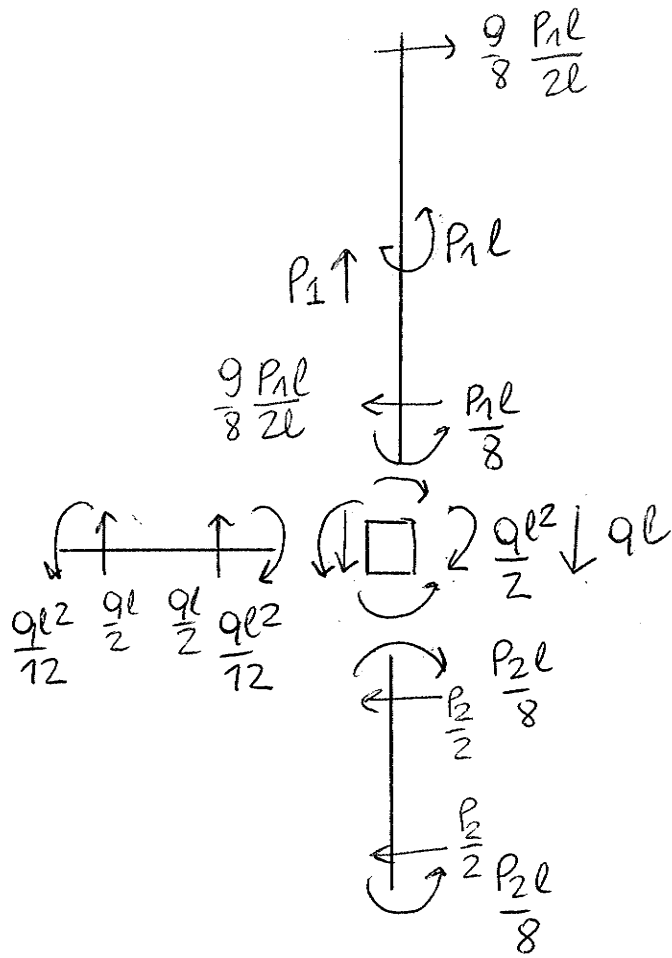
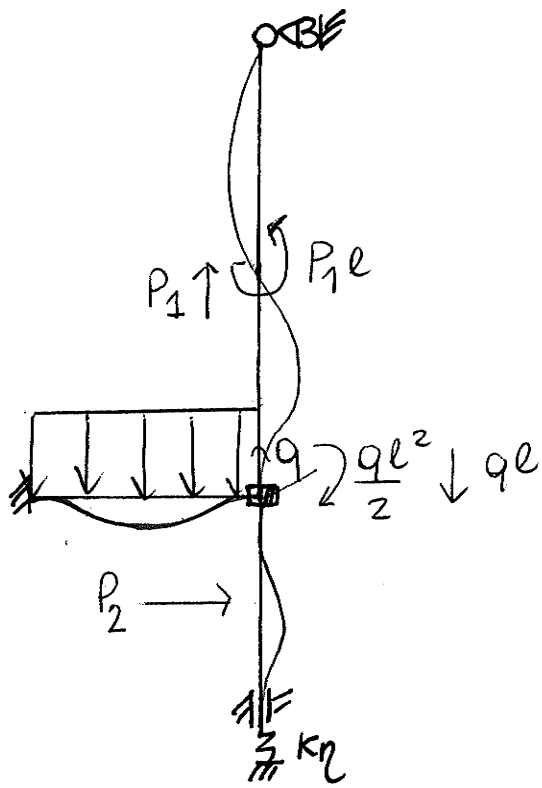
CASO 2: $\eta \neq 0$; $\eta = 1$



$$M_{C\eta} = - \frac{6EJ}{e^2}$$

$$H_{\eta C} = - K\eta - \frac{12EJ}{e^3}$$

CASO 3: CARICHI $\neq 0$



$$M_{\phi} = \frac{ql^2}{12} + \frac{P_2l}{8} - \frac{ql^2}{2} - \frac{P_1l}{8}$$

$$H_{\eta} = \frac{ql}{2} + ql - P_1$$

IL SISTEMA RISOLVENTE E' IL SEGUENTE:

$$\begin{cases} \frac{19 EJ}{2 l} \varphi_C + \left(-\frac{6 EJ}{l^2}\right) \eta + \left(\frac{ql^2}{12} + \frac{P_2 l}{8} - \frac{ql^2}{2} - \frac{P_1 l}{8}\right) = 0 \\ \frac{6 EJ}{l^2} \varphi_C + \left(-\frac{38 EJ}{l^3} - \frac{12 EJ}{l^3}\right) + \left(\frac{ql}{2} + ql - P_1\right) = 0 \end{cases}$$

$$\begin{cases} \frac{19 EJ}{2 l} \varphi_C - \frac{6 EJ}{l^2} \eta + \left(\frac{ql^2}{12} + \frac{52}{8} ql^2 - \frac{ql^2}{2} - \frac{10 ql^2}{8}\right) = 0 \\ \frac{6 EJ}{l^2} \varphi_C - \frac{50 EJ}{l^3} + \left(\frac{ql}{2} + ql - 10 ql\right) = 0 \end{cases}$$

$$\begin{cases} \frac{19 EJ}{2 l} \varphi_C - \frac{6 EJ}{l^2} \eta + \frac{29}{6} ql^2 = 0 \\ \frac{6 EJ}{l^2} \varphi_C - \frac{50 EJ}{l^3} - \frac{17}{2} ql^2 = 0 \end{cases}$$

$$\begin{cases} \frac{19}{2} \varphi_C l - 6 \eta + \frac{29}{6} \frac{ql^4}{EJ} = 0 \\ \left(6 \varphi_C l - 50 \eta - \frac{17}{2} \frac{ql^4}{EJ}\right) \cdot \frac{6}{50} \end{cases}$$

$$\begin{cases} \frac{19}{2} \varphi_C l - 6 \eta + \frac{29}{6} \frac{ql^4}{EJ} = 0 \\ \frac{36}{50} \varphi_C l - 6 \eta + \frac{51}{50} \frac{ql^4}{EJ} = 0 \quad \ominus \end{cases}$$

$$\left(\frac{19}{2} - \frac{36}{50}\right) \varphi_C l + \left(\frac{29}{6} + \frac{51}{50}\right) \frac{ql^4}{EJ} = 0$$

$$\frac{439}{50} \varphi_C l = -\frac{439}{75} \frac{ql^4}{EJ}$$

$$\boxed{\varphi_C = -\frac{50}{75} \frac{ql^3}{EJ} = -\frac{2}{3} \frac{ql^3}{EJ}}$$

$$\frac{19}{2} \left(-\frac{2}{3} \frac{ql^4}{EJ}\right) l - 6 \eta + \frac{29}{6} \frac{ql^4}{EJ} = 0$$

$$-\frac{19}{3} \frac{ql^4}{EJ} - 6 \eta + \frac{29}{6} \frac{ql^4}{EJ} = 0$$

$$6 \eta = -\frac{3}{2} \frac{ql^4}{EJ}$$

$$\boxed{\eta = -\frac{3}{12} \frac{ql^4}{EJ} = -\frac{1}{4} \frac{ql^4}{EJ}}$$

$$\varphi_C = -\frac{2}{3} \frac{ql^3}{EJ}$$

$$\eta = -\frac{1}{4} \frac{ql^4}{EJ}$$

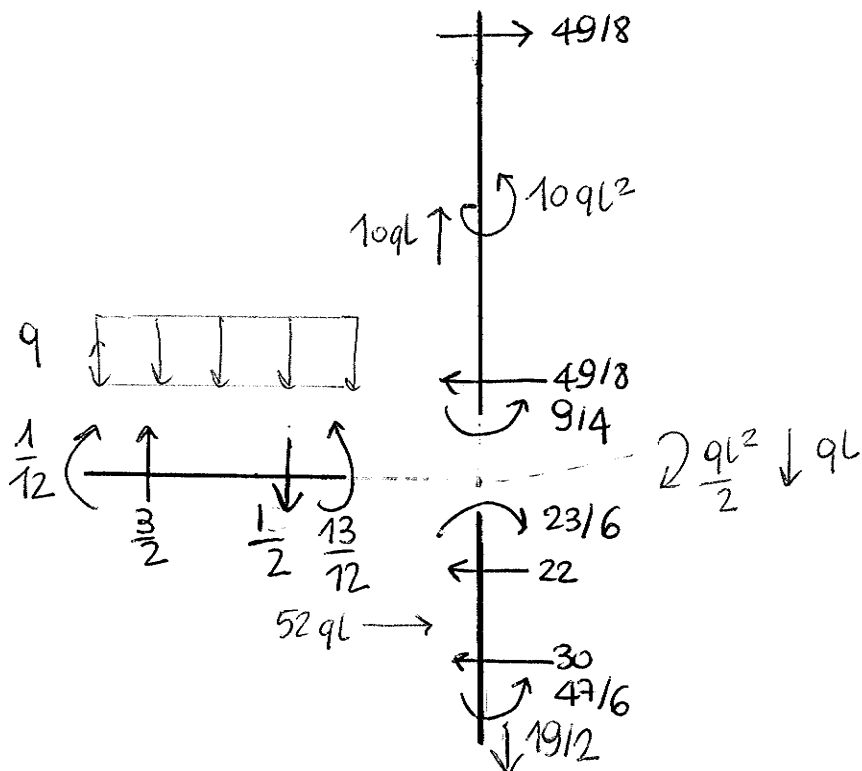
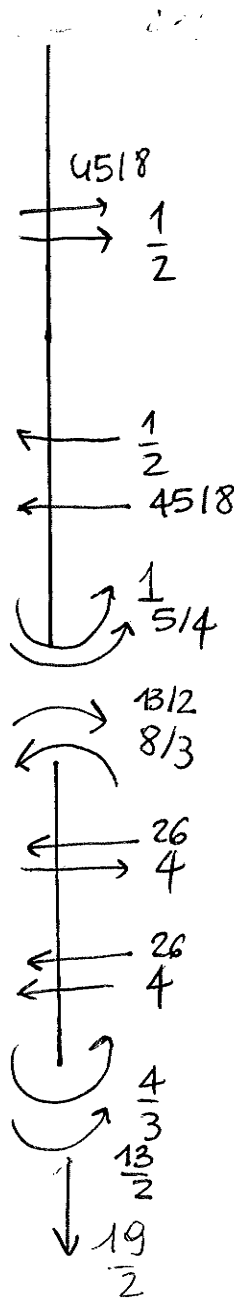
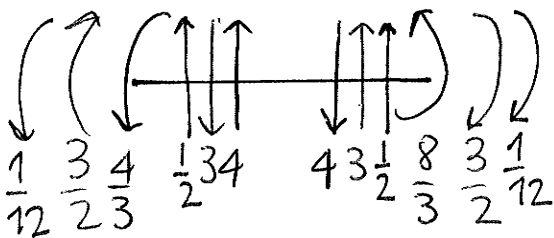
REAZIONE DELLA MOLLA
 $\frac{38 EJ}{l^3} \cdot \left(\frac{1}{4} \frac{ql^4}{EJ}\right) = \frac{19}{2} ql$ VERSO IL BASSO

(5)

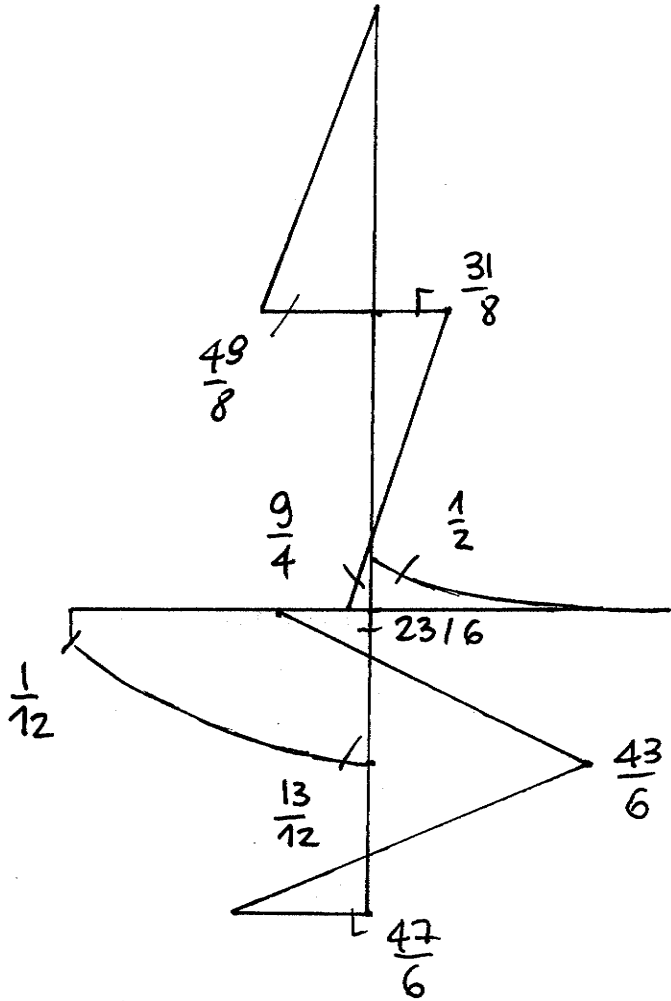
▣ AZIONI
DOWTE A
$$U_E = -\frac{2}{3} \frac{ql^3}{EI}$$

▣ AZIONI
DOWTE
A
$$U = -\frac{1}{4} \frac{ql^3}{EI}$$

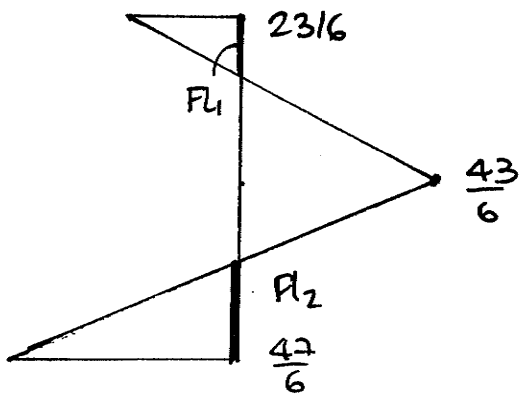
▣ AZIONI
DOWTE AI
CARICHI



(M) [962]



POSIZIONE FLESSI ASTA EC



$$Fl_1 = \frac{23}{6} : x = \frac{23}{6} + \frac{43}{6} : \frac{l}{2}$$

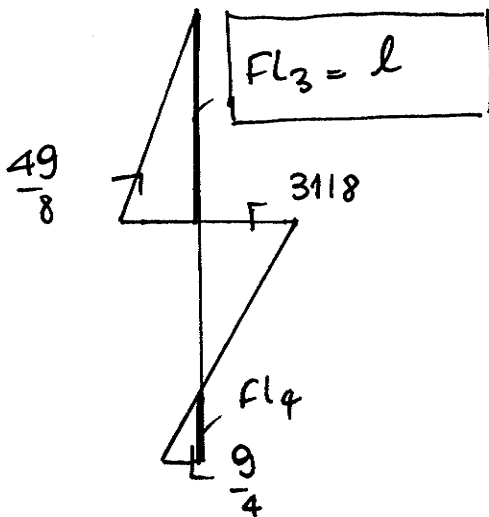
$$\frac{23}{6} : x = \frac{66}{6} : \frac{l}{2}$$

$$x = Fl_1 = \frac{23}{132} l \approx 0.17l$$

$$Fl_2 : \frac{47}{6} : x = \frac{47}{6} + \frac{43}{6} : \frac{l}{2}$$

$$x = Fl_2 = \frac{47}{180} l \approx 0.26l$$

POSIZIONE FLESSI ASTA AC

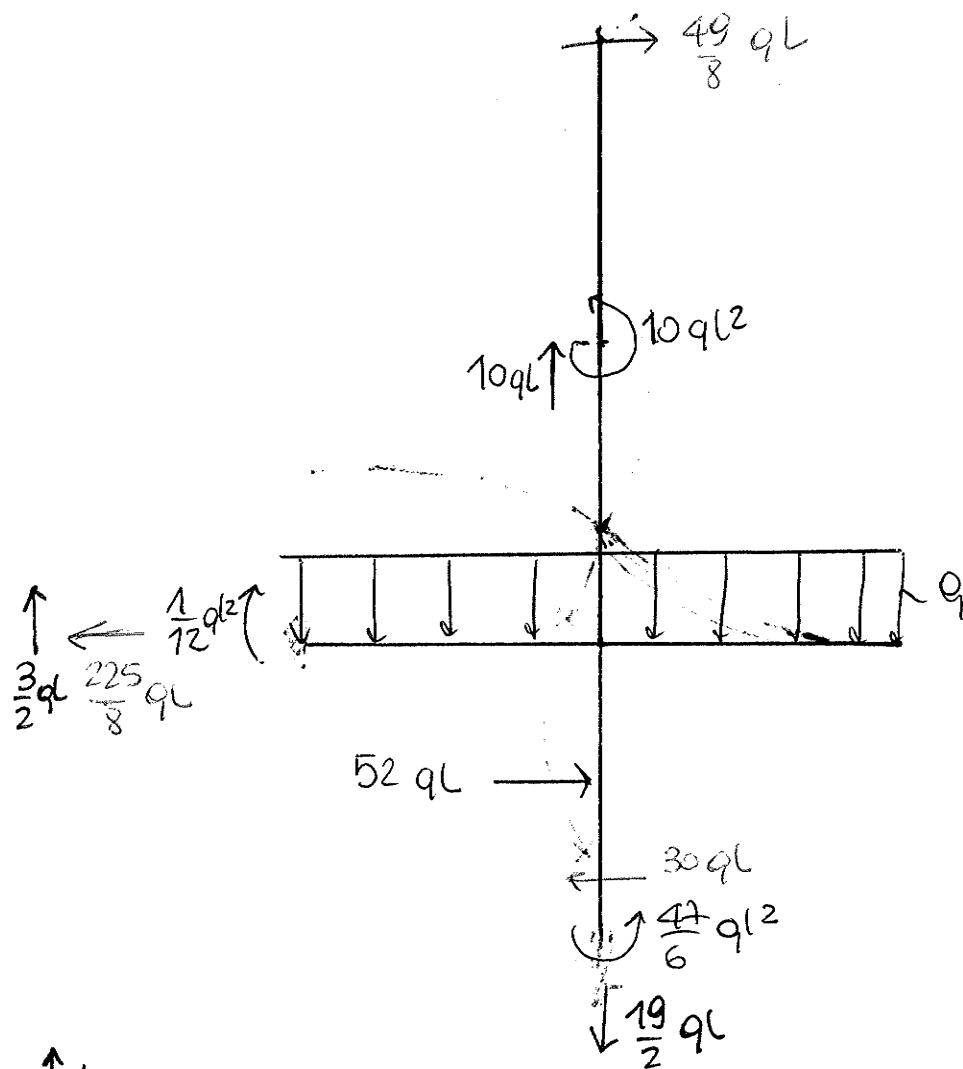


$$Fl_4 : \frac{9}{4} : x = \frac{9}{4} + \frac{31}{8} : l$$

$$\frac{9}{4} : x = \frac{49}{8} : l$$

$$x = Fl_4 = \frac{9}{49} l \cdot \frac{8^2}{49} = \frac{18}{49} l \approx 0.37l$$

EQUILIBRIO GLOBALE



$$\Sigma F_V = 0 \uparrow +$$

$$10qL + \frac{3}{2}qL + q(2L) - \frac{19}{2}qL = \frac{20+3-4-19}{2}qL = 0 \quad \text{OK!}$$

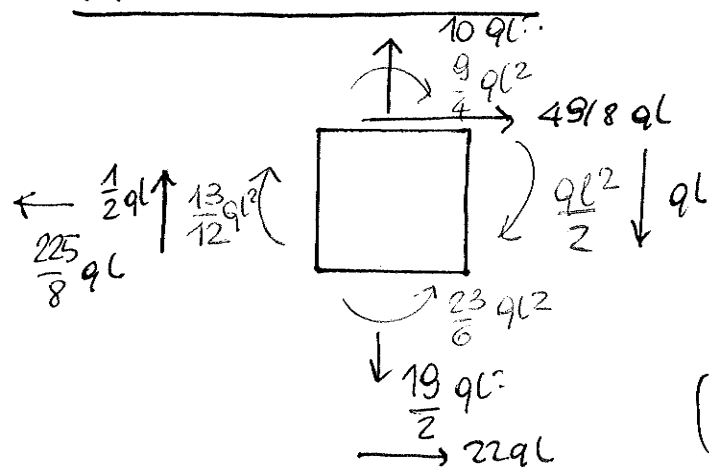
$$\Sigma F_H = 0 \rightarrow +$$

$$\frac{49}{8}qL - \frac{225}{8}qL + 52qL - 30qL = 0 \quad \text{OK!}$$

$$\Sigma M = 0 \text{ (PUNTO E)} \curvearrowright +$$

$$\frac{49}{8}(2)ql^2 - 10ql^2 + \frac{1}{12}ql^2 + \frac{3}{2}ql^2 - 52 \cdot \frac{1}{2}(ql^2) + 30ql^2 - \frac{47}{6}ql^2 = 0 \quad \text{OK!}$$

EQUILIBRIO AL NODO



$$\Sigma F_V = 0$$

$$10qL + \frac{1}{2}qL - qL - \frac{19}{2}qL = 0 \quad \text{OK!}$$

$$\Sigma F_H = 0$$

$$\frac{225}{8}qL - \frac{49}{8}qL - 22qL = 0 \quad \text{OK!}$$

$$\Sigma M = 0$$

$$\left(\frac{13}{12} + \frac{9}{4} + \frac{1}{2} - \frac{23}{6}\right)ql^2 = 0 \quad \text{OK!}$$

DEFORMATA QUALITATIVA

