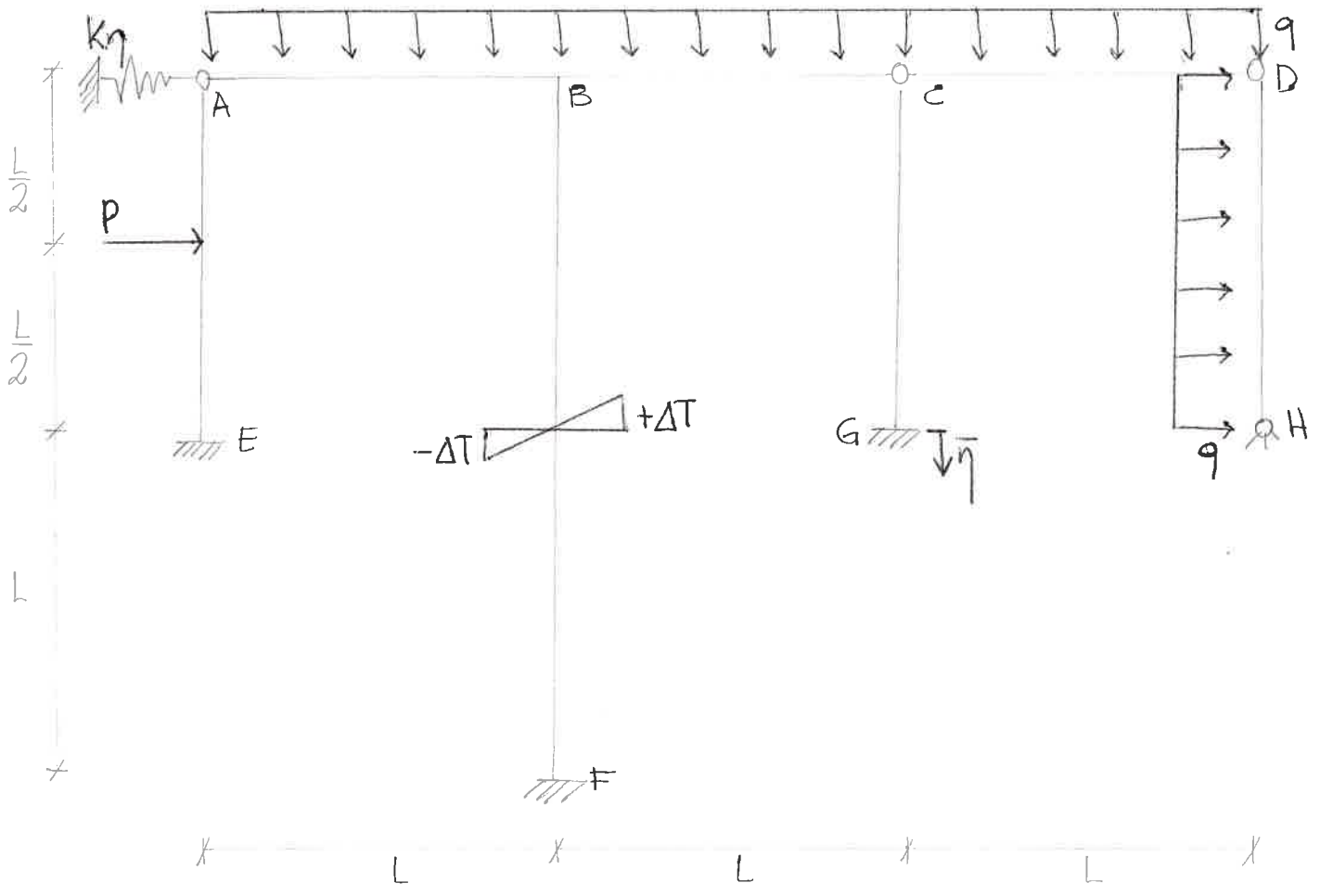


# TEMA ESAME 26 NOVEMBRE 2018



$$\frac{\Delta T}{H} = \frac{1}{32} \frac{qL^2}{EJ}$$

$$K_H = \frac{9}{4} \frac{EJ}{L^3}$$

$$P = 2qL$$

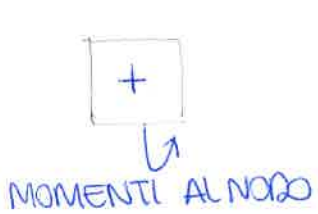
$$\bar{\eta} = \frac{1}{8} \frac{qL^4}{EJ}$$

$GdV = 15$   
 $GdL = 20$

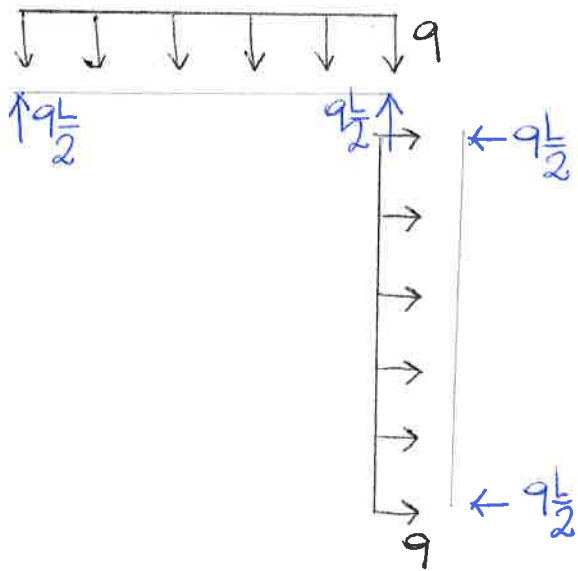
SI OSSERVA CHE IL TELAI È A NODI SPSTABILI → BIELLA FITTIZIA INA



N CONVENZIONE DI SEGNO



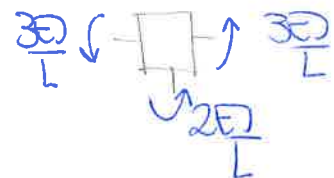
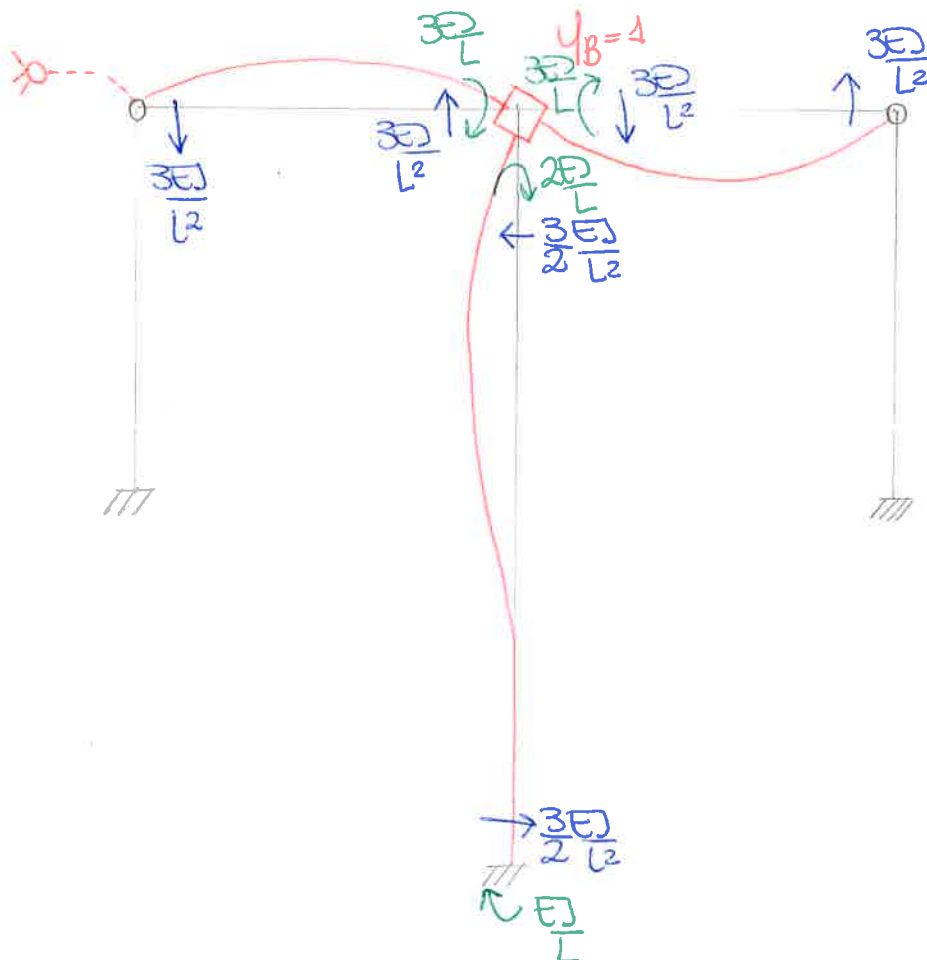
N APPENDICE ISOSTATICA CDH



N SISTEMA RISOLVENTE

$$\begin{cases} \Sigma M_B \\ \Sigma R_A \end{cases} \begin{cases} M_{BB} \varphi_B + M_{Bq} \eta_A + M_{B0} = 0 \\ h \eta_B \varphi_B + h \eta q \eta_A + h \eta_0 = 0 \end{cases}$$

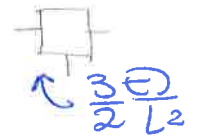
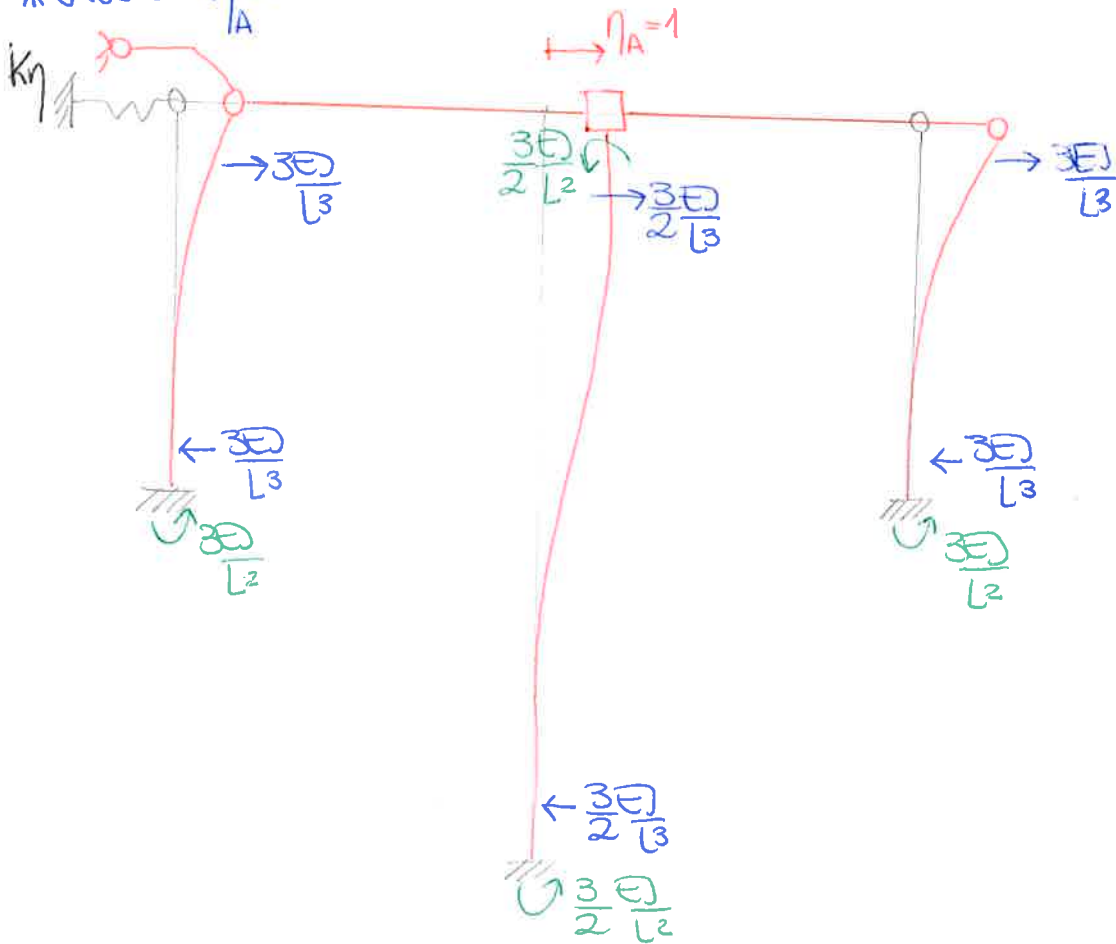
\*CASO 1:  $\varphi_B = 1$



$$M_{BB} = \frac{8EJ}{L}$$

$$h \eta_B = \frac{3}{2} \frac{EJ}{L^2}$$

\*CASO 2:  $\eta_A = 1$

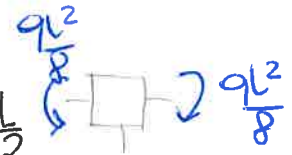
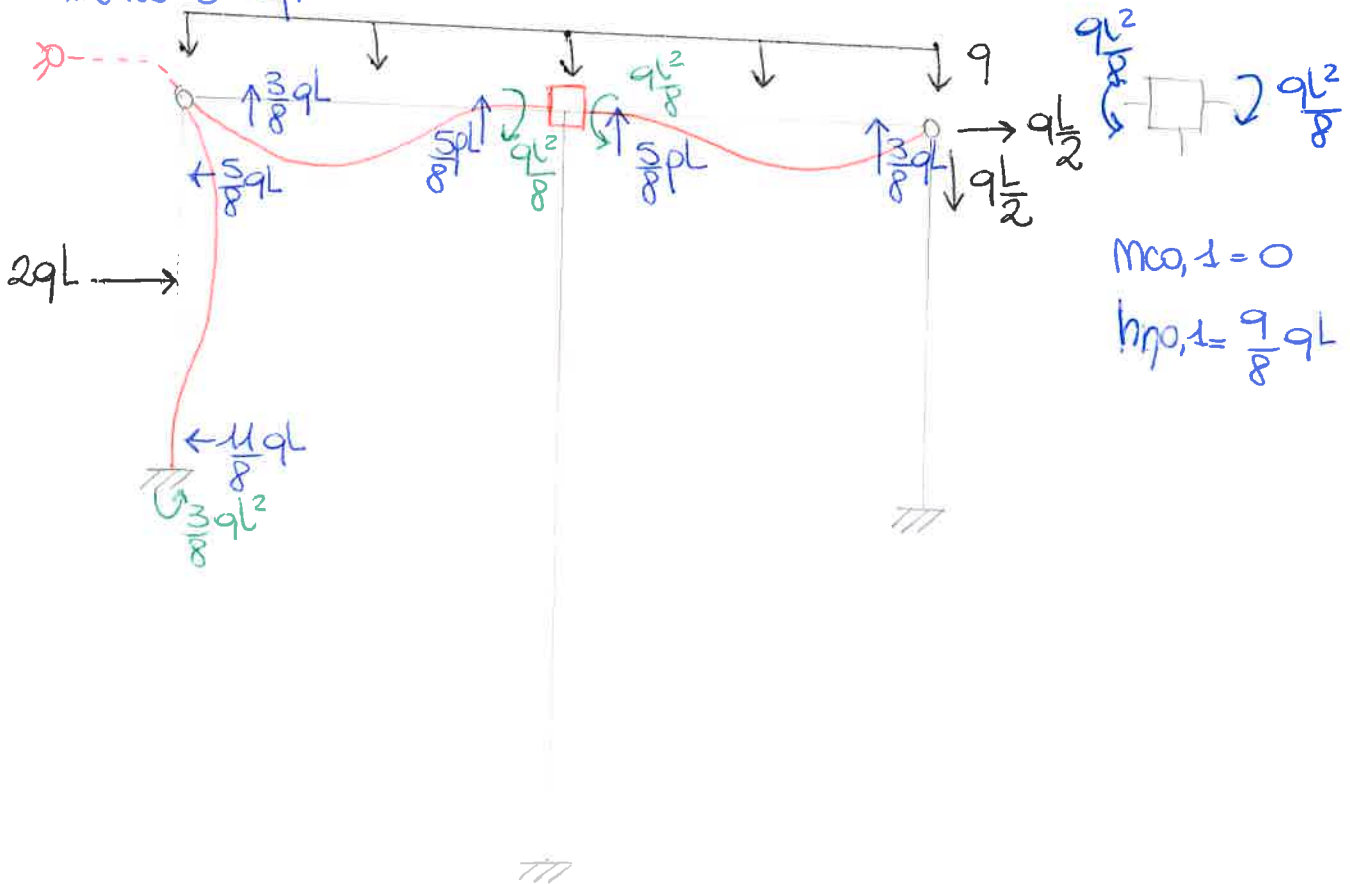


$$M_{B\eta} = -\frac{3}{2} \frac{E\theta}{L^2}$$

$$h_{\eta\eta} = -\frac{15}{2} \frac{E\theta}{L^3} - k\eta$$

$$= -\frac{39}{4} \frac{E\theta}{L^3}$$

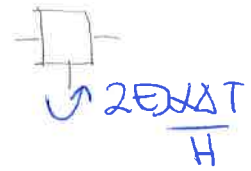
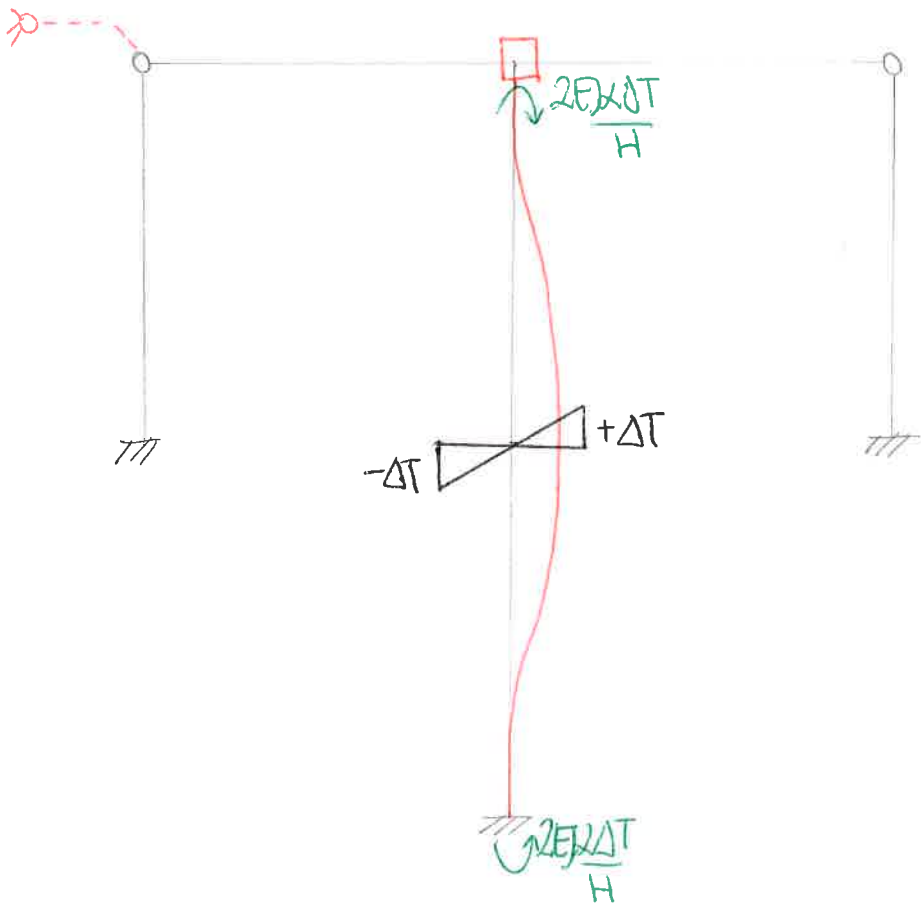
\*CASO 3:  $q \neq 0$



$$M_{C0,1} = 0$$

$$h_{\eta\eta,1} = \frac{9}{8} qL$$

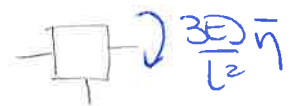
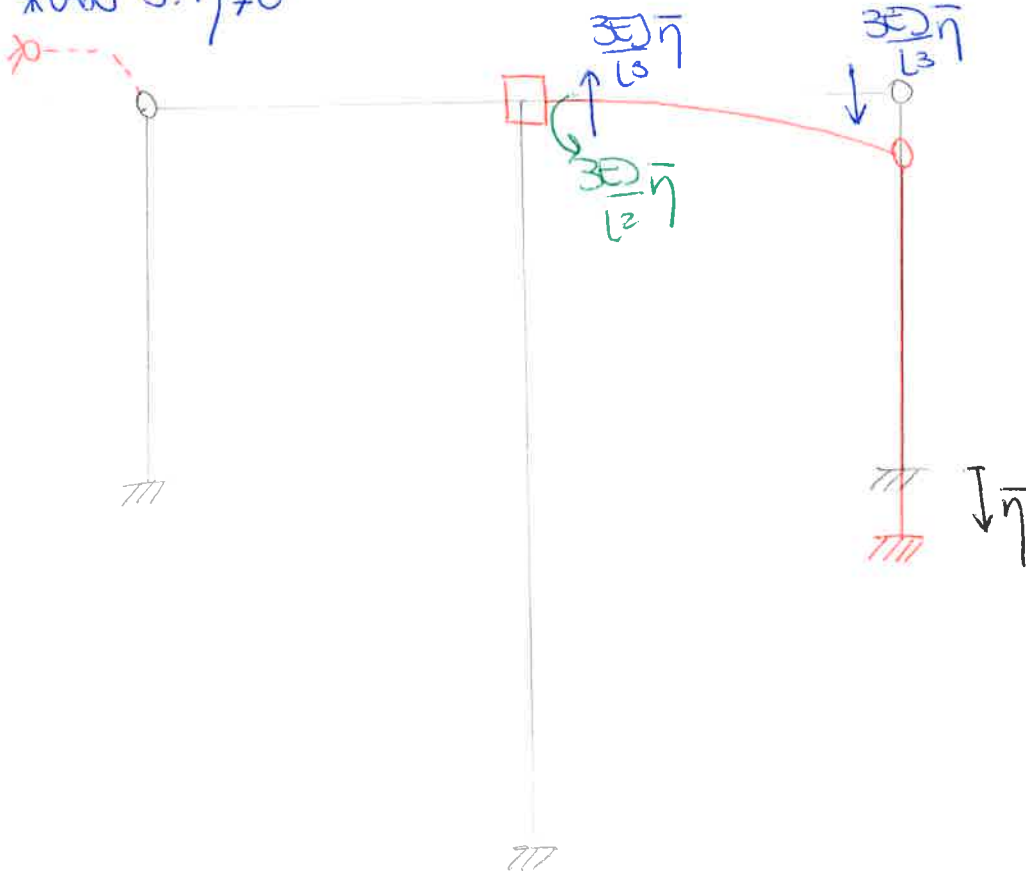
\* CASO 4:  $\Delta T \neq 0$



$$M_{c0,2} = \frac{1}{16} qL^2$$

$$h_{p0,2} = 0$$

\* CASO 5:  $\bar{\eta} \neq 0$



$$M_{c0,3} = -\frac{3}{8} qL^2$$

$$h_{p0,3} = 0$$

IL SISTEMA RISOLVENTE

$$\begin{cases} 8 \frac{EJ}{L} \varphi_B - \frac{3 EJ}{2 L^2} \eta_A + \frac{1}{16} qL^2 - \frac{3}{8} qL^2 = 0 & (1) \\ \frac{3 EJ}{2 L^2} \varphi_B - \frac{39 EJ}{4 L^3} \eta_A + \frac{9}{8} qL = 0 & (2) \end{cases}$$

MOLTIPLICO (1) PER  $\frac{3}{16L}$

$$8 \cdot \frac{3}{16L} \frac{EJ}{L} \varphi_B - \frac{3}{2} \cdot \frac{3}{16L} \frac{EJ}{L^2} \eta_A + \frac{1}{16} \cdot \frac{3}{16L} qL^2 - \frac{3}{8} \cdot \frac{3}{16L} qL^2 = 0$$

$$\frac{3 EJ}{2 L^2} \varphi_B - \frac{9 EJ}{32 L^3} \eta_A + \frac{3}{256} qL - \frac{9}{128} qL = 0$$

$$\frac{3 EJ}{2 L^2} \varphi_B - \frac{9 EJ}{32 L^3} \eta_A - \frac{15}{256} qL = 0$$

(1) - (2)

$$\left( \frac{3}{2} - \frac{3}{2} \right) \frac{EJ}{L^2} \varphi_B + \left( -\frac{9}{32} + \frac{39}{4} \right) \frac{EJ}{L^3} \eta_A + \left( -\frac{15}{256} - \frac{9}{8} \right) qL = 0$$

$$\frac{303 EJ}{32 L^3} \eta_A = \frac{303}{256} qL$$

$$\eta_A = \frac{1}{8} \frac{qL^4}{EJ}$$

SOSTITUISCO  $\eta_A$  IN (1)

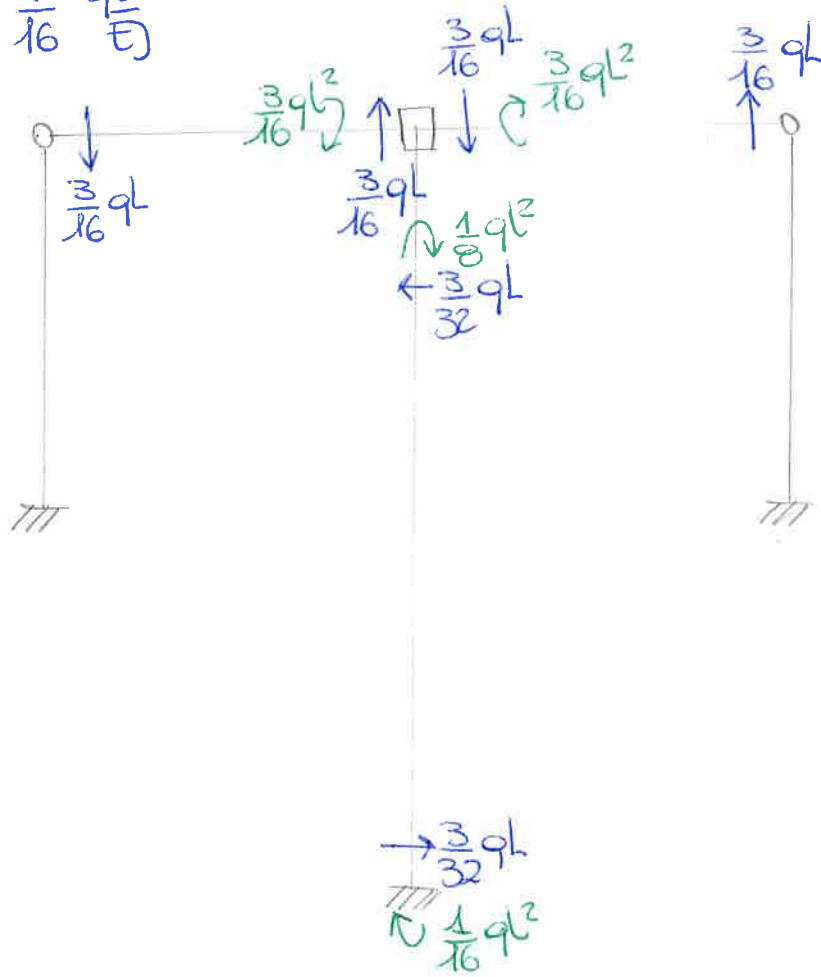
$$8 \frac{EJ}{L} \varphi_B - \frac{3 EJ}{2 L^2} \cdot \frac{1}{8} \frac{qL^4}{EJ} + \frac{1}{16} qL^2 - \frac{3}{8} qL^2 = 0$$

$$8 \frac{EJ}{L} \varphi_B - \frac{3}{16} qL^2 + \frac{1}{16} qL^2 - \frac{3}{8} qL^2 = 0$$

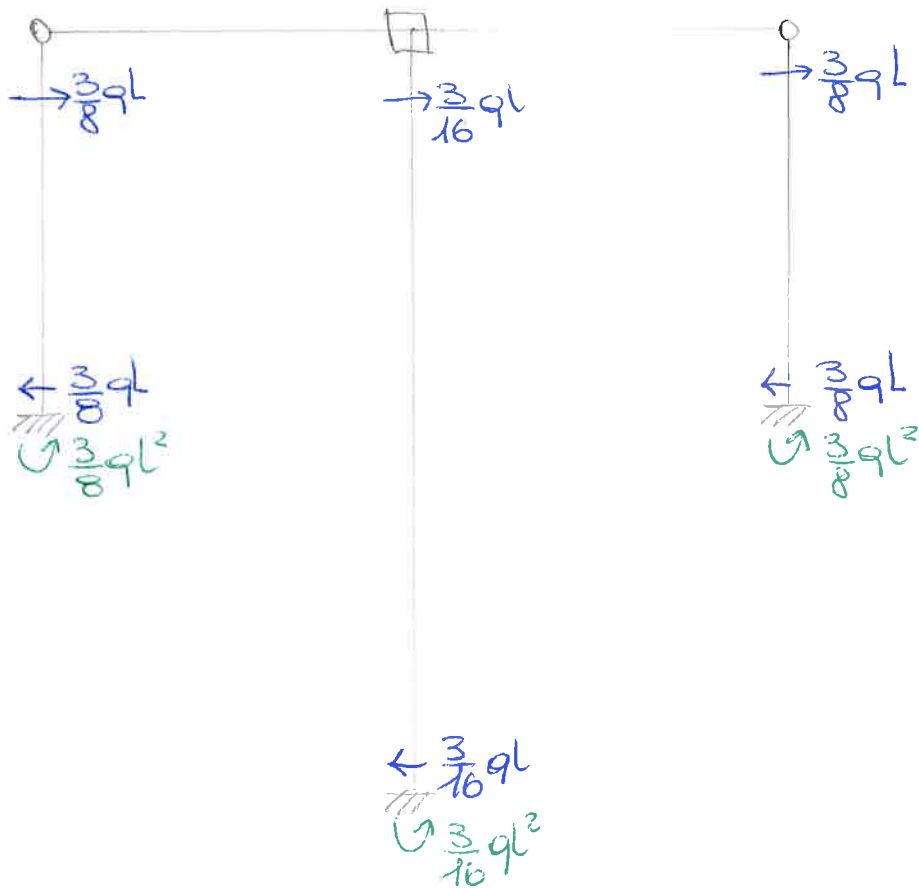
$$\frac{8 EJ}{L} \varphi_B = \frac{1}{2} qL^2$$

$$\varphi_B = \frac{1}{16} \frac{qL^3}{EJ}$$

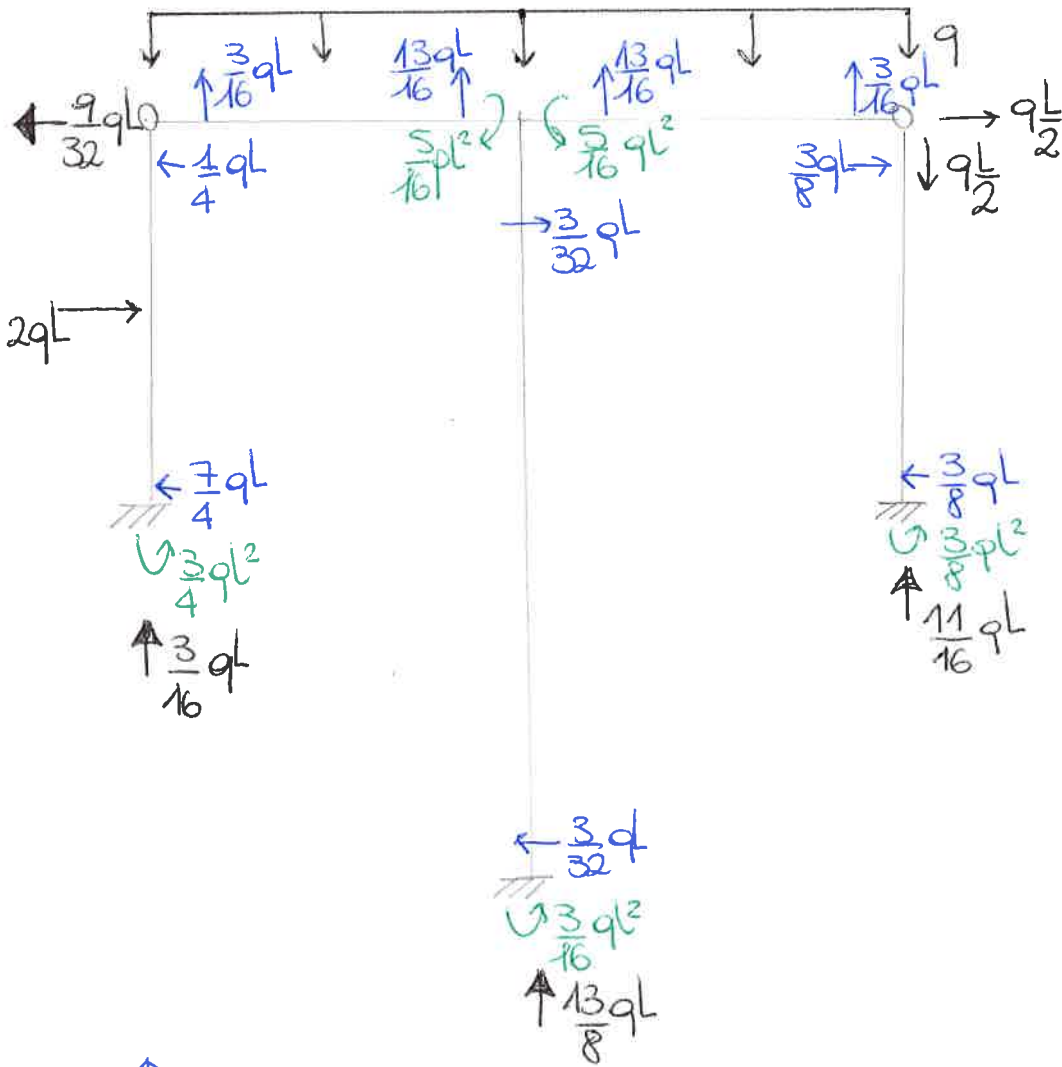
$$\chi_B = \frac{1}{16} \frac{ql^3}{EI}$$



$$\chi_A = \frac{1}{8} \frac{ql^4}{EI}$$



# NCALCOLO AZIONI INTERNE



$$EQ \uparrow = 0$$

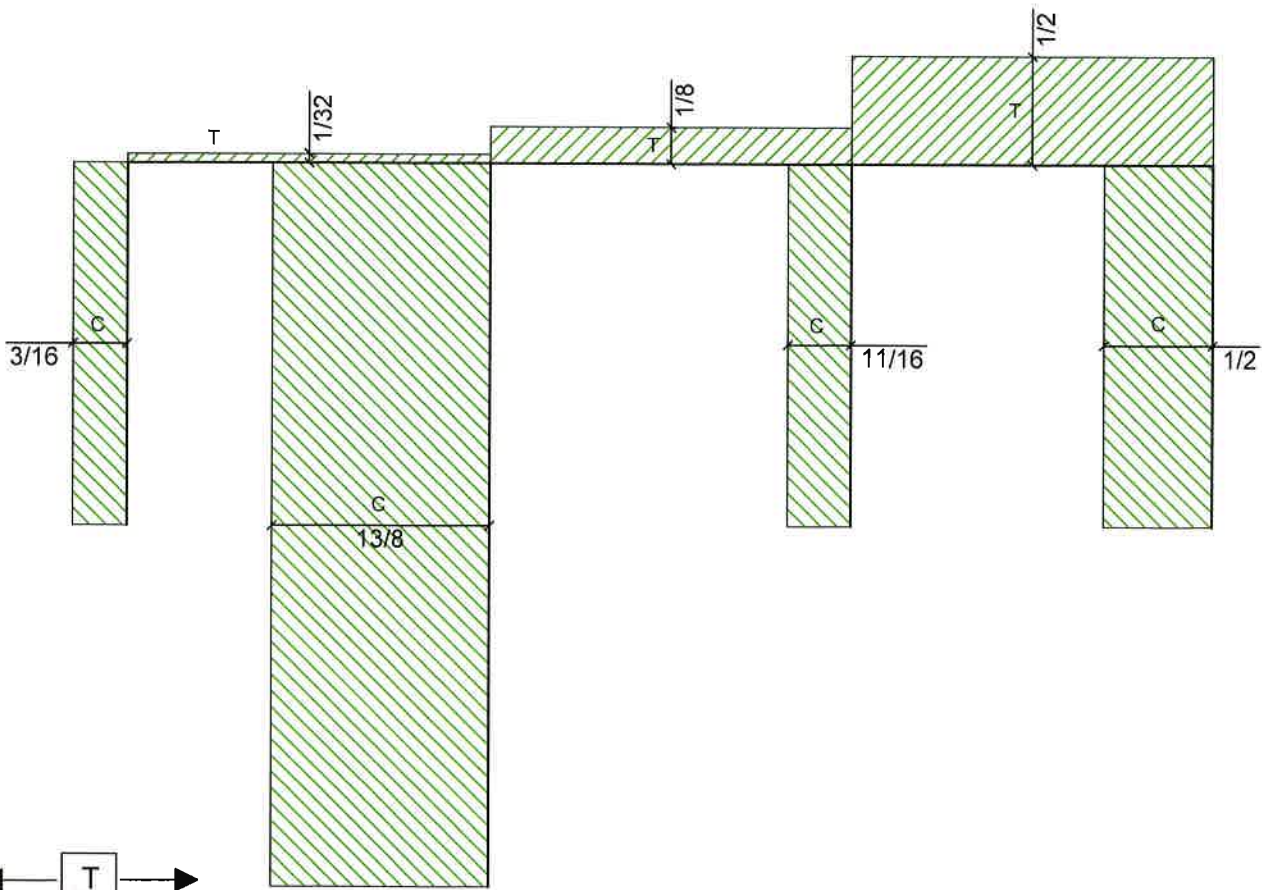
$$\frac{11}{16} ql - 2ql + \frac{13}{8} ql - \frac{9l}{2} + \frac{3}{16} ql = 0 \quad \text{ok!}$$

$$EQ \rightarrow = 0$$

$$2ql - \frac{7}{4} ql - \frac{3}{32} ql - \frac{3}{8} ql + \frac{1}{2} ql - \frac{9}{4} ql = 0 \quad \text{ok!}$$

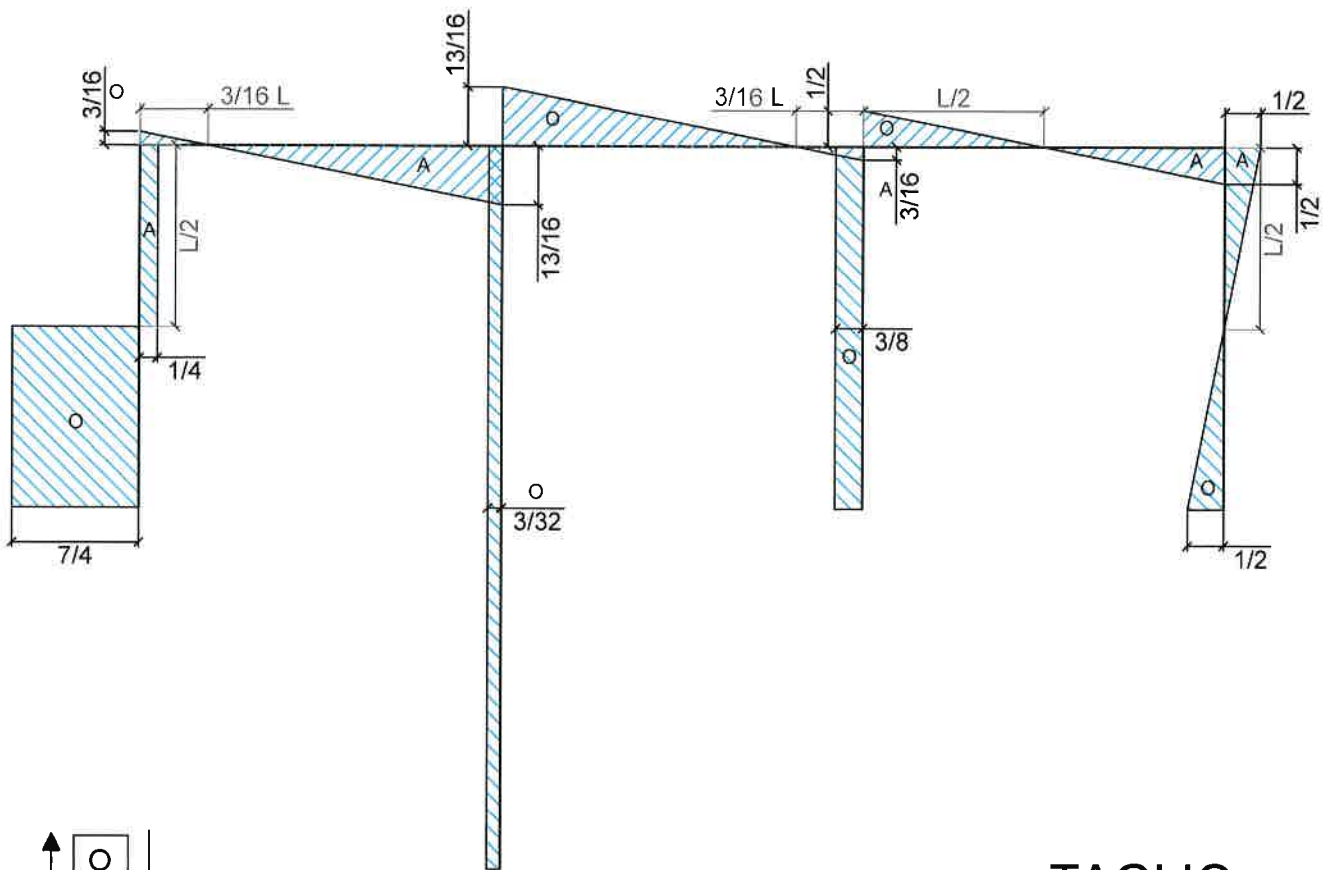
$$+ \sum M_F = 0$$

$$-\frac{3}{16} ql^2 + \frac{3}{16} ql \cdot L - \frac{3}{4} ql^2 - \frac{7}{4} ql \cdot L + 2ql \cdot \frac{3}{2} l - \frac{9}{32} ql \cdot 2l + \frac{9l}{2} \cdot L + \frac{9l}{2} \cdot 2l - \frac{3}{8} ql \cdot L - \frac{3}{8} ql^2 - \frac{11}{16} ql \cdot L = 0 \quad \text{ok!}$$



## AZIONE ASSIALE

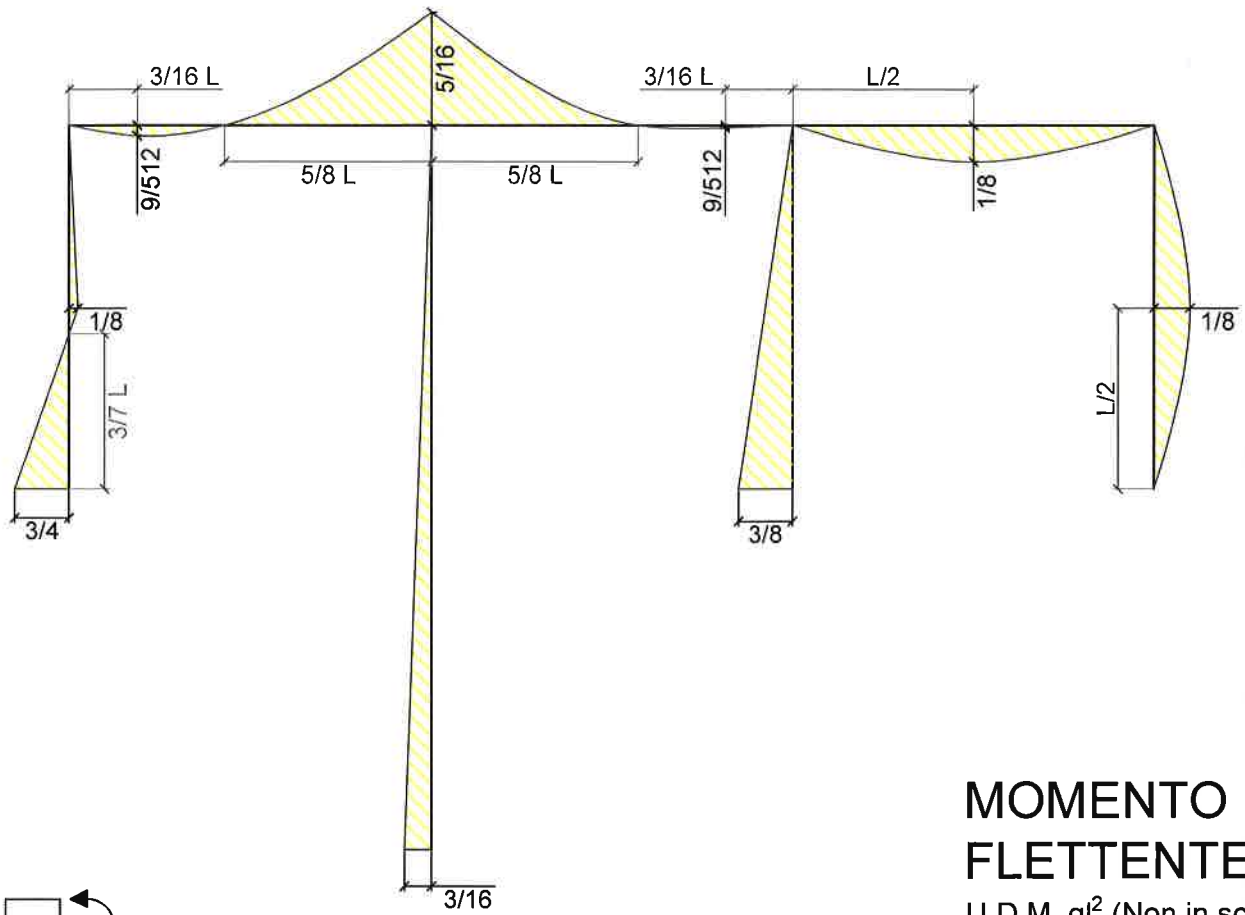
U.D.M. ql (Non in scala)



## TAGLIO

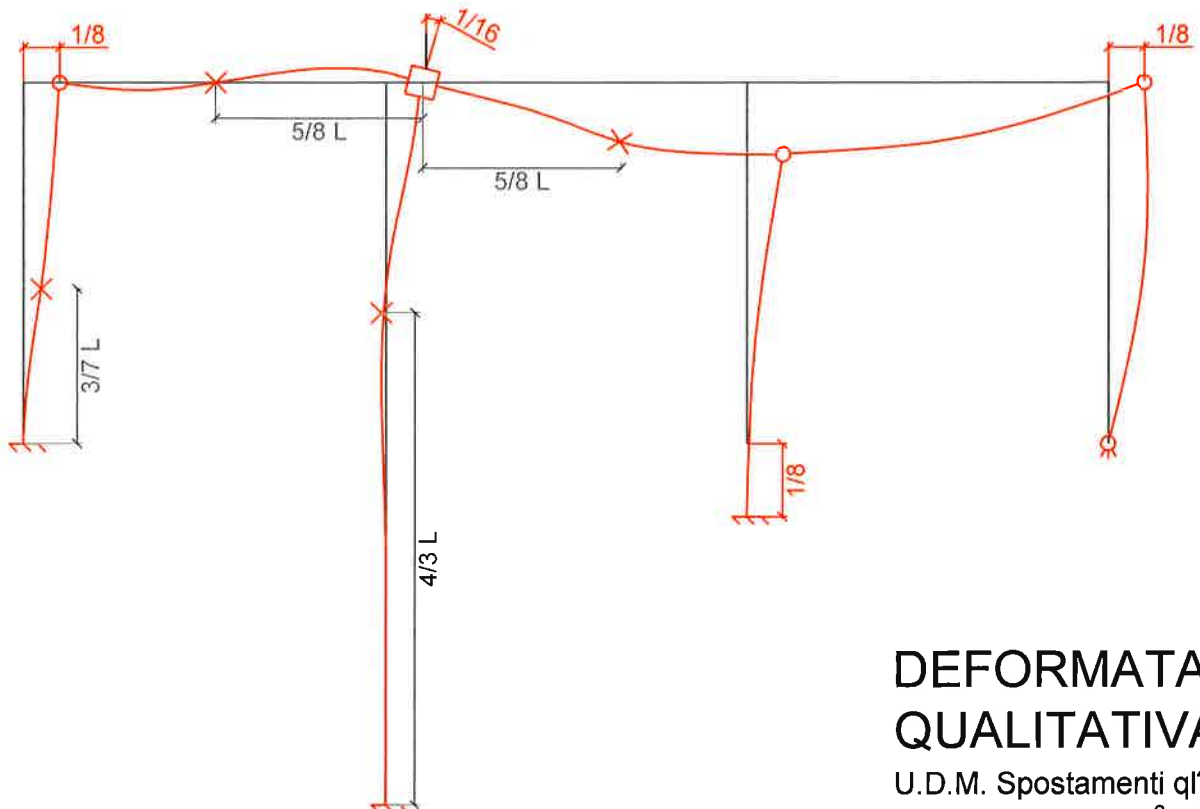
U.D.M. ql (Non in scala)





## MOMENTO FLETTENTE

U.D.M.  $ql^2$  (Non in scala)



## DEFORMATA QUALITATIVA

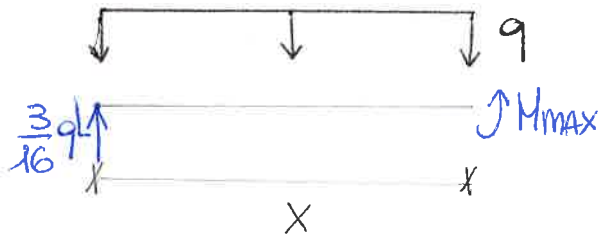
U.D.M. Spostamenti  $ql^4/EJ$

U.D.M. Rotazioni  $ql^3/EJ$

U.D.M. Posizione flessi I

~ MOMENTO MASSIMO

$$M_1 = M_2$$



$$M_{max} = -q \cdot \frac{x^2}{2} + \frac{3}{16} qL \cdot x$$

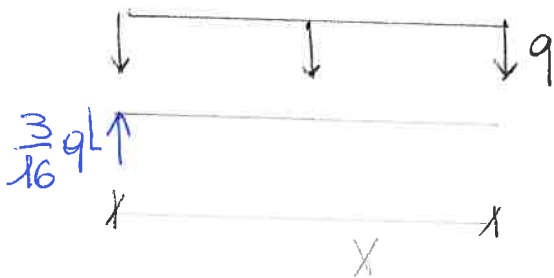
$$\frac{dMx}{dx} = -q \cdot x + \frac{3}{16} qL = 0$$

$$x = \frac{3}{16} L$$

$$M = -q \cdot \left(\frac{3L}{16}\right)^2 \cdot \frac{1}{2} + \frac{3}{16} qL \cdot \frac{3L}{16} = + \frac{9}{512} qL^2$$

~ FLESSI

$$f_1 = f_2$$



$$M = \frac{3}{16} qL \cdot x - q \frac{x^2}{2} = 0$$

$$x \left( \frac{3}{16} qL - \frac{1}{2} x \right) = 0$$

$$\frac{1}{2} x = \frac{3}{16}$$

$$x = \frac{3L}{8}$$

N STUDIO SEGNO DEFORMATA TERMICA

$$y'' = -\frac{M(x)}{E} - \frac{2\alpha\Delta T}{H}$$

$$M = \frac{3}{32} qLx - \frac{3}{16} qL^2$$

$$y''(x) = -\frac{1}{E} \left( \frac{3}{32} qLx - \frac{3}{16} qL^2 \right) - 2 \cdot \frac{1}{32} \frac{qL^2}{E}$$

$$y''(x) \cdot E = -\frac{3}{32} qLx + \frac{3}{16} qL^2 - \frac{1}{16} qL^2 \geq 0$$

$$\frac{3}{32} qLx \leq \frac{1}{8} qL^2$$

$$x \leq \frac{4}{3} L$$

