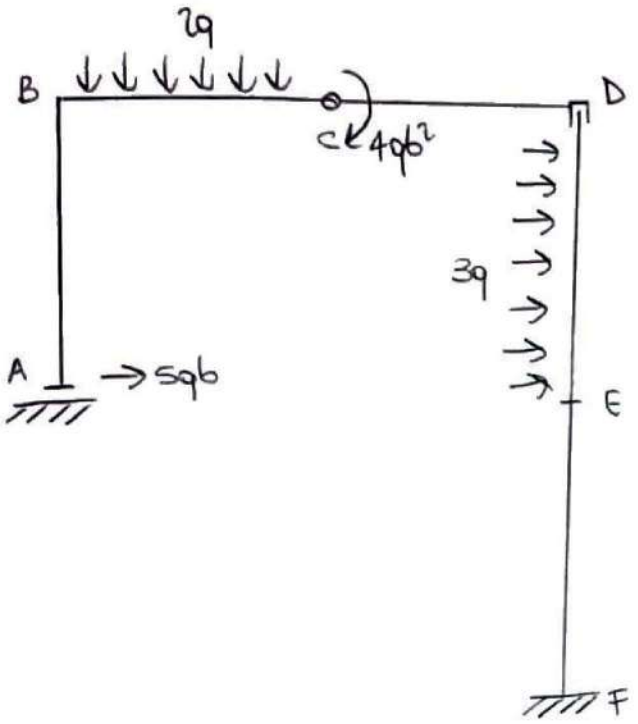
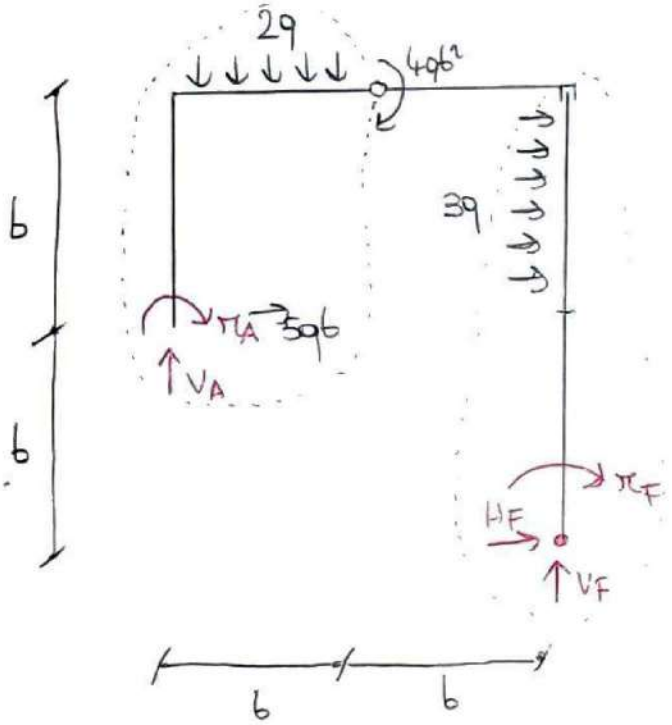


STRUTTURA ISOSTATICA

GDL = 3+3+3 = 9

GDV = 2(A)+2(C)+2(B)+3(F) = 9

DIAGRAMMA DI CORPO LIBERO



Eq. CARDINALI

$$\begin{cases} R_x = 0 & 3qb + H_F + 5qb = 0 \quad [1] \\ R_y = 0 & V_A + V_F - 2qb = 0 \quad [2] \\ \Pi_{z(F)} = 0 & \Pi_F + \Pi_A + 5qb^2 + V_A 2b - \cancel{2q\frac{3}{2}b^2} + \\ & + 4qb^2 + 3q\frac{3}{2}b^2 = 0 \quad [3] \end{cases}$$

Eq. AUSILIARIE

$$\begin{cases} \Pi_{z(C)} = 0 & \cancel{2q\frac{b^2}{2}} - \Pi_A - V_A b + 5qb^2 = 0 \quad [4] \\ R_y = 0 & V_F = 0 \quad [5] \end{cases}$$

[1] $H_F = -8qb$

[2] $V_A = 2qb$

[4] $\Pi_A + 2qb^2 - 6qb^2 = 0 \quad \Pi_A = 4qb^2$

[3] $\Pi_F + 4qb^2 + 5qb^2 + 4qb^2 - 3qb^2 + 4qb^2 + \frac{9}{2}qb^2 = 0$

$\Pi_F + 14qb^2 + \frac{9}{2}qb^2 = 0 \quad \Pi_F = -\frac{37}{2}qb^2$

REAZIONI VINCOLARI

$H_F = -8qb$

$V_A = 2qb$

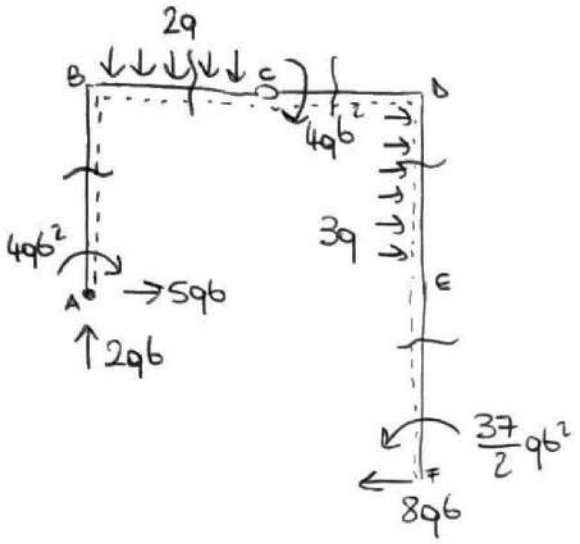
$\Pi_A = 4qb^2$

$\Pi_F = -\frac{37}{2}qb^2$

$V_F = 0$

VERIFICA

DIAGRAMMA

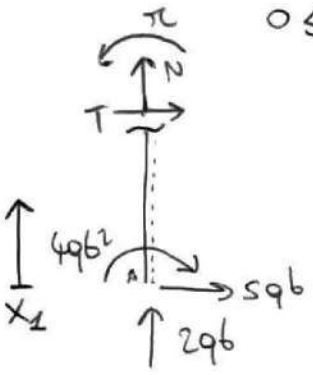


$$\pi_{z(A)} = 0 \quad \cancel{4b^2} + \cancel{2q}\frac{b^2}{\cancel{2}} + \cancel{4qb^2} + 3q\frac{b^2}{2} - \frac{37}{2}qb^2 + \cancel{3qb^2} = 0$$

$$\pi_{z(A)} = 0 \quad 23 - \frac{37}{2} = 0$$

$$\pi_{z(A)} = \left(\cancel{23} - \frac{34}{2}\right)qb^2 = 0 \quad V$$

eq. AZIONI INTERNE



$0 \leq x_1 \leq b$

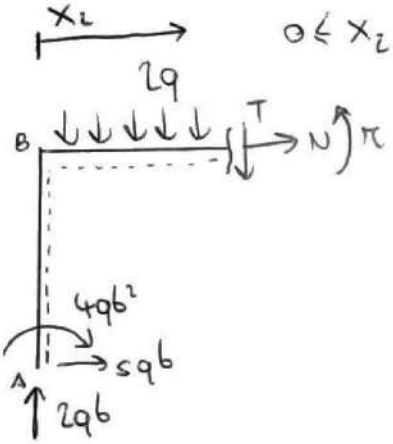
$R_{//} = 0 \quad N(x) + 2qb = 0 \Rightarrow N(x) = -2qb$

$R_{\perp} = 0 \quad T(x) + 5qb = 0 \Rightarrow T(x) = -5qb$

$\pi_{z(x)} = 0 \quad \pi(x) + 5qbx - 4qb^2 = 0 \quad \pi(x) = 4qb^2 - 5qbx$

$\pi(x=0) = 4qb^2$

$\pi(x=b) = -qb^2$



$R_{//} = 0 \quad N(x) + 5qb = 0 \Rightarrow N(x) = -5qb$

$R_{\perp} = 0 \quad T(x) - 2qb + 2q(x) = 0 \Rightarrow T(x) = 2qb - 2qx$

$\pi_{z(x)} = 0 \quad *\pi(x) + \cancel{2q}\frac{x^2}{\cancel{2}} - 2qbx - 4qb^2 + 5qb^2 = 0$

$*\pi(x) = -qb^2 + 2qbx - qx^2$

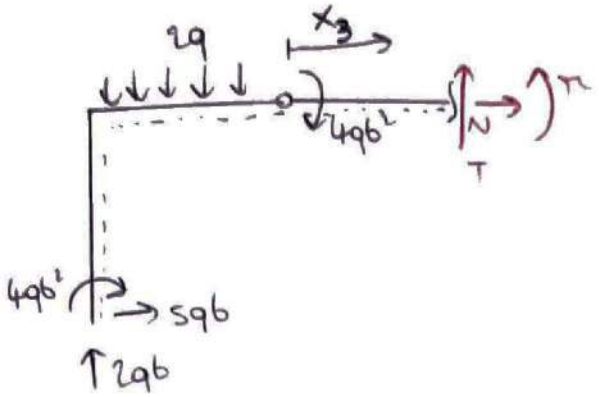
$T(x=0) = 2qb$

$T(x=b) = 2qb - 2qb \quad T(x=b) = 0$

$\pi(x=0) = qb^2$

$\pi(x=b) = -\cancel{qb^2} + \cancel{2qb^2} - \cancel{qb^2} = 0$

$0 \le x_3 \le b$



$R_{//} = 0 \quad N(x) + 5qb = 0 \Rightarrow N(x) = -5qb$

$R_{\perp} = 0 \quad T(x) - 2qb + 2qb = 0$

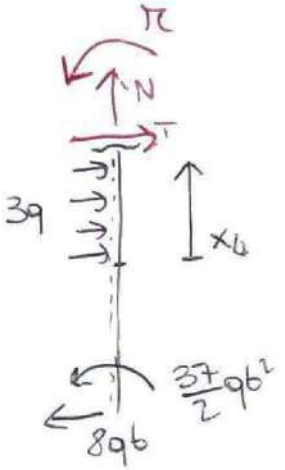
$\pi_{z(x)} = 0 \quad \pi(x) + 2q\left(x + \frac{b}{2}\right) - 4qb^2 - 4qb^2 + 5qb^2 + -2qb(b+x) = 0$

$T(x) = 0$

$\pi(x) + 2qbx + qb^2 - 4qb^2 - 4qb^2 + 5qb^2 - 2qb^2 - 2qbx = 0$

$\pi(x) = 4qb^2$

$0 \le x_4 \le b$



$R_{//} = 0 \quad N(x) = 0$

$R_{\perp} = 0 \quad T(x) + 3qx - 8qb = 0$

$\pi_{z(x)} = 0 \quad \pi(x) + 3q\frac{x^2}{2} - 8qb(b+x) + \frac{37}{2}qb^2 = 0$

$T(x) = -3qx + 8qb$

$T(x=0) = +8qb$

$T(x=b) = +5qb$

$\pi(x) = -\frac{3}{2}qx^2 + 8qb^2 + 8qbx - \frac{37}{2}qb^2$

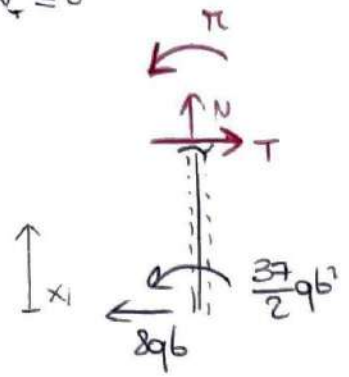
$\pi(x) = -\frac{3}{2}qx^2 + 8qbx - \frac{21}{2}qb^2$

$\pi(x=0) = -\frac{21}{2}qb^2$

$\pi(x=b) = -\frac{24}{2}qb^2 + 8qb^2$

$\pi(x=b) = -4qb^2$

$0 \leq x_1 \leq b$



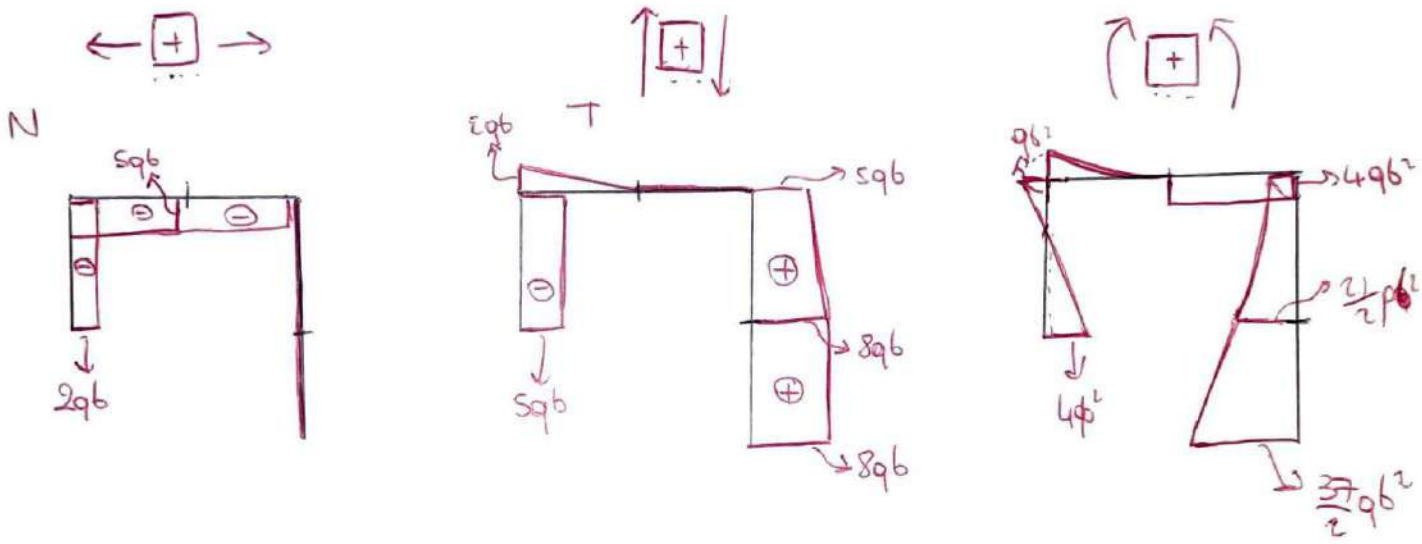
$R_{//} = 0 \qquad N(x) = 0$

$R_{\perp} = 0 \qquad T(x) = 8qb$

$\pi_{z(x)} = 0 \qquad \pi(x) + \frac{37}{2}qb^2 - 8qbx = 0$

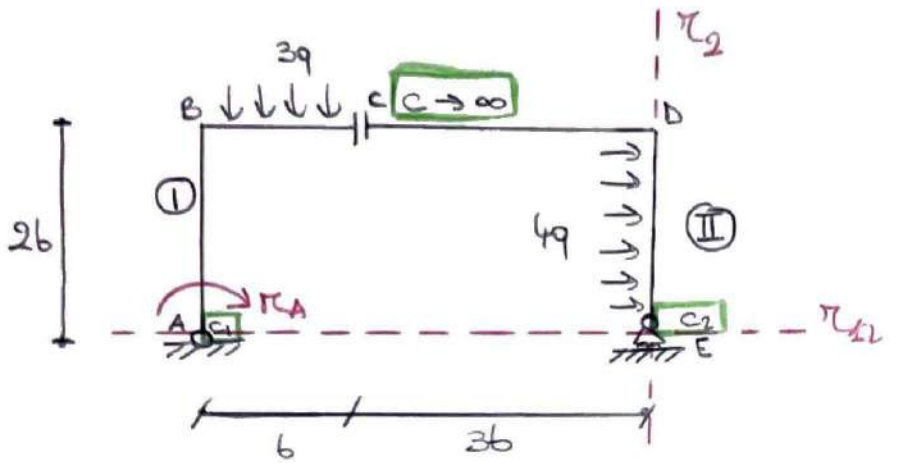
$\pi(x=0) = -\frac{37}{2}qb^2$

$\pi(x=b) = -\frac{21}{2}qb^2$



ESERCIZIO 2 - PARTE I

INDIVIDUAZIONE CENTRI ASSOLUTI E RELATIVI



ORIGINE ≡ A (0;0)

CIR → C_1; C_2;

CIRR → C_{12}

PLV → r_A

$C_1 \equiv A \equiv (0;0)$

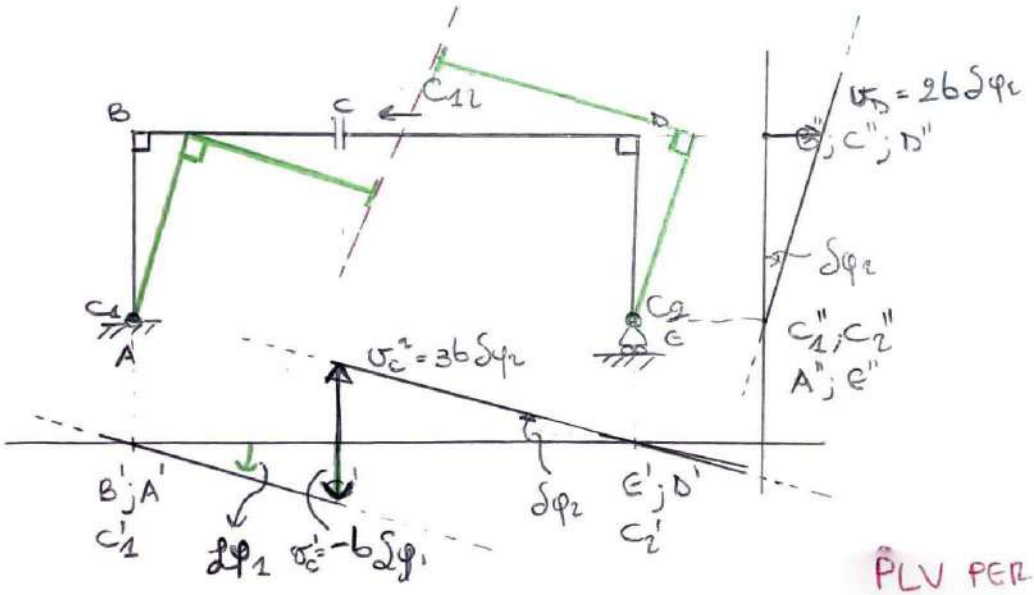
$C_{12} \equiv (\infty;0)$

CONDIZIONI CINEMATICHE

$\begin{cases} C_2 \in r_2 \\ C_1 \leftrightarrow C_{12} \leftrightarrow C_2 \end{cases}$

$C_2 \equiv E \equiv (46;0)$

GRAFICO DELLA SPOSTATA RIGIDA



$\delta\varphi_1 = \delta\varphi_2$

$C_1 = (0;0)$ $\quad v_C' = -6\delta\varphi_1$

$C_{12} = (\infty;0)$ $\quad v_D^2 = 26\delta\varphi_2$

$C_2 = (46;0)$

$r_A = -\frac{19}{2}qb^2$

PLV PER DETERMINARE r_A

$r_A \delta\varphi_1 + \frac{3}{2}qb^2\delta\varphi_1 + 8qb^2\delta\varphi_2 = 0$

$r_A = \frac{-3-16}{2}qb^2 = -\frac{19}{2}qb^2$

ESERCIZIO 2 - PARTE II

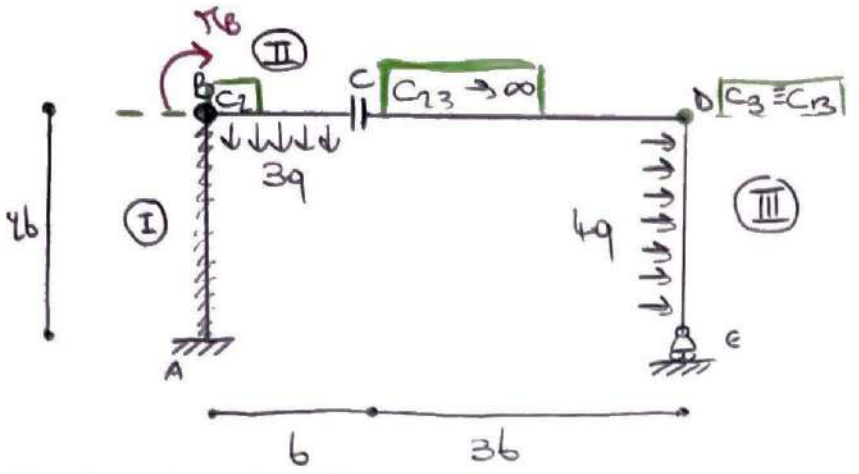
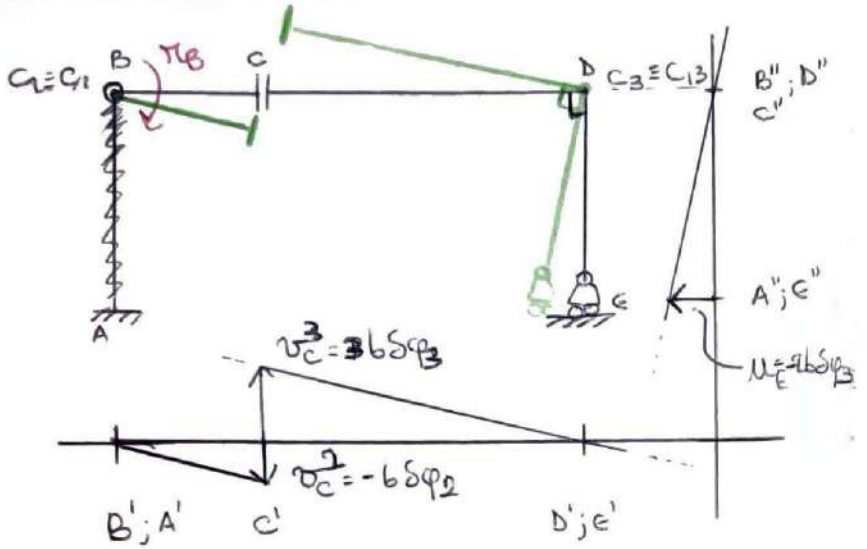


GRAFICO LAVORI REALI



PLV $\to \pi_B$

$v_C^{(2)}$; μ_E

$C_1 \not\exists$

L'ASTA I NON ATTORNO NOTO

$C_2 \equiv B \equiv (0;2b)$

$C_{23} = (\infty;0)$

CONDIZIONI

$$\begin{cases} C_1 \leftrightarrow C_{21} \leftrightarrow C_2 \\ C_2 \leftrightarrow C_{23} \leftrightarrow C_3 \end{cases}$$

$$\begin{cases} C_1 \leftrightarrow C_{13} \leftrightarrow C_3 \\ C_{12} \leftrightarrow C_{23} \leftrightarrow C_{13} \end{cases}$$

$C_3 \equiv D \equiv (4b;2b)$

$$\delta\varphi_1 = \delta\varphi_2 = \delta\varphi_3$$

$$\pi_B \delta\varphi_2 + \frac{3}{2}qb^2\delta\varphi_2 + 4q\cdot 2b^2\delta\varphi_3 = 0$$

$$\pi_B + \frac{3}{2}qb^2 + 8qb^2 = 0$$

$$\pi_B + \frac{3}{2}qb^2 + \frac{16}{2}qb^2 = -\frac{13}{2}qb^2$$

$\pi_B = -\frac{13}{2}qb^2$

$v_C^{(2)} = -b\,\delta\varphi_2$

$\mu_E = -2b\,\delta\varphi_3$