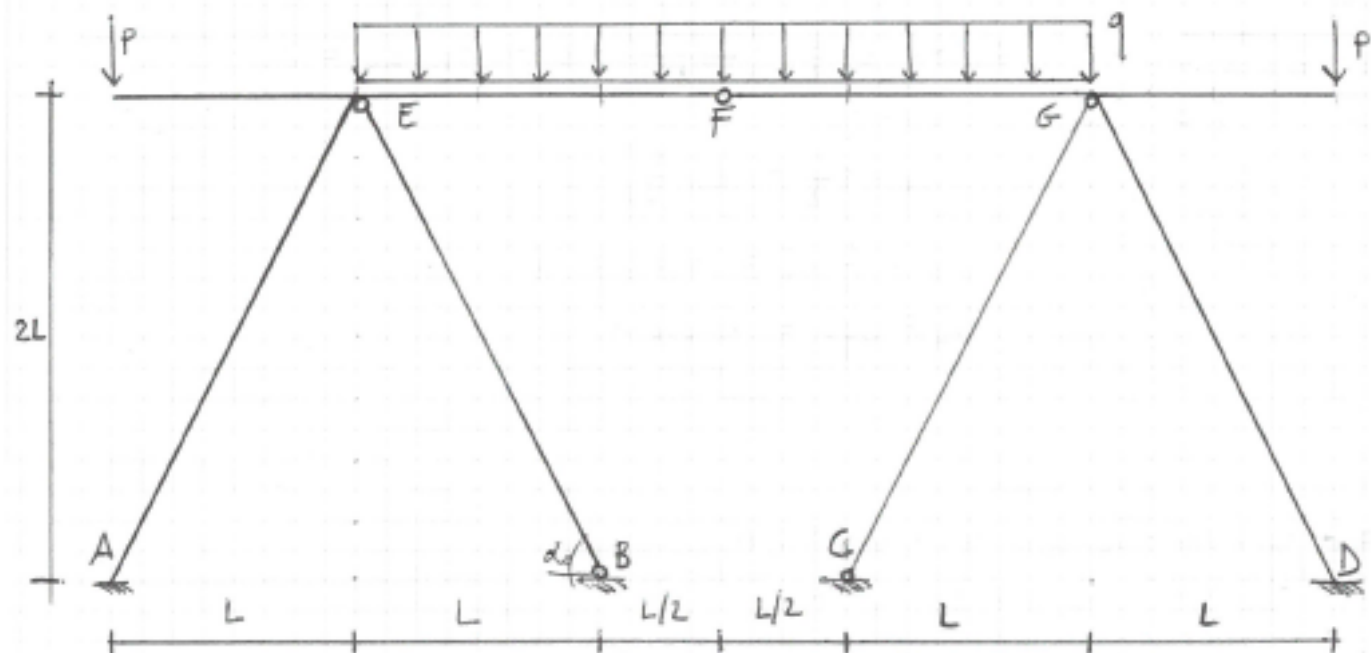
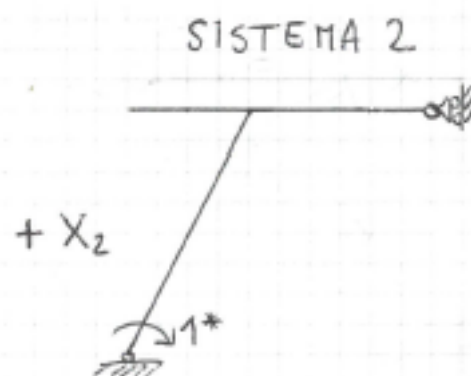
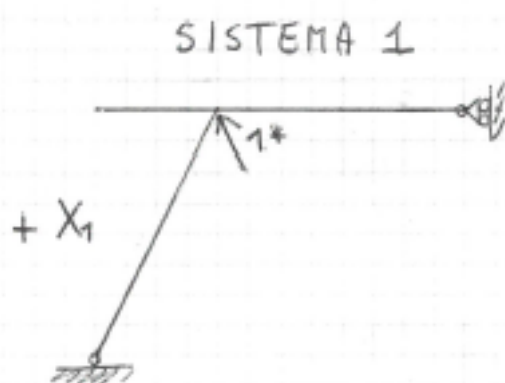
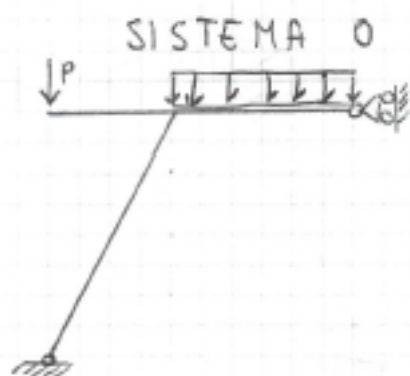
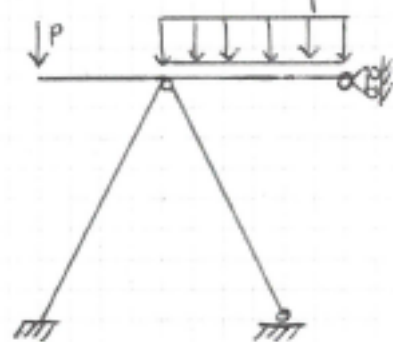


II PARZIALE FILA A

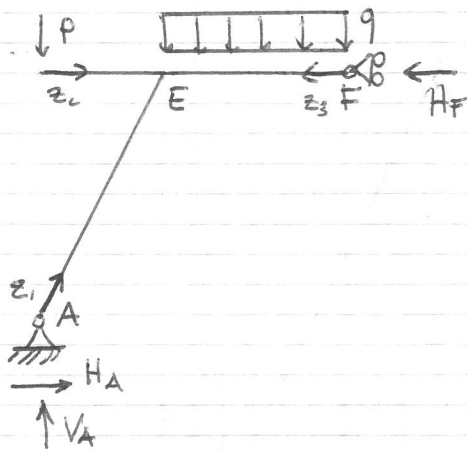


$L = 3\text{ m}$ $q = 3000\text{ N/m}$ $P = ql/2 = 4500\text{ N}$
 $\alpha_0 = 63.43^\circ$

Struttura 2 volte iperstatica



SISTEMA 0



$$A) -q \left(l + \frac{l}{2} \right) \cdot \left(\frac{(l + l/2)}{2} + l \right) + H_F \cdot 2l = 0$$

$$H_F = H_A$$

$$V_A = q \frac{l}{2} + q \left(l + \frac{l}{2} \right)$$

$$H_F = \frac{21}{16} q l = 11812.5 \text{ N}$$

$$V_A = 2ql = 18000 \text{ N}$$

$$z_1 \rightarrow N = -H_A \cos \alpha - V_A \sin \alpha = -21382 \text{ N}$$

$$T = -H_A \sin \alpha + V_A \cos \alpha = -2514 \text{ N}$$

$$M = V_A \cos \alpha z - H_A \sin \alpha z$$

$$M(0) = 0$$

$$M\left(\frac{l}{\cos \alpha}\right) = 16869$$

$$z_2 \rightarrow N = 0$$

$$T = \frac{ql}{2} = 4500 \text{ N}$$

$$M = -\frac{ql}{2} z \quad M(z_2 = 3) = 13500 \text{ N}$$

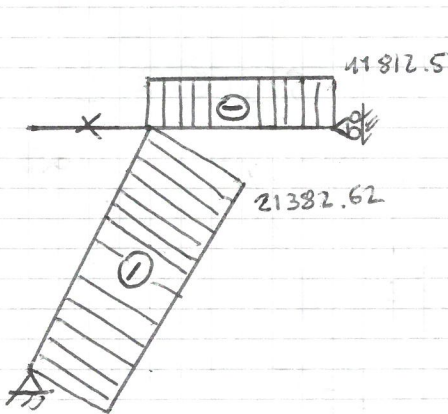
$$z_3 \rightarrow N = -11812.5 \text{ N}$$

$$T = -ql$$

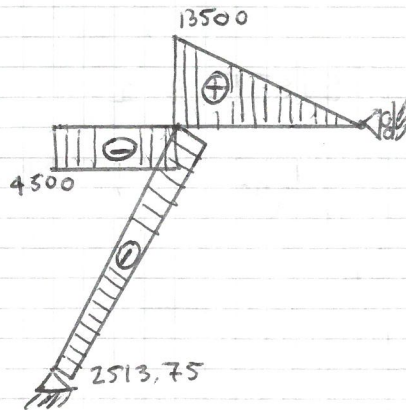
$$T(z_3 = 4.5) = 13500 \text{ N}$$

$$M = -q \frac{z^2}{2}$$

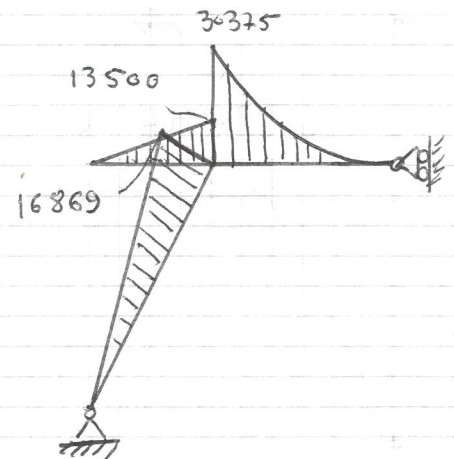
$$M(z_3 = 4.5) = 30375 \text{ N}$$



N [N]

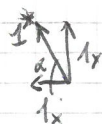
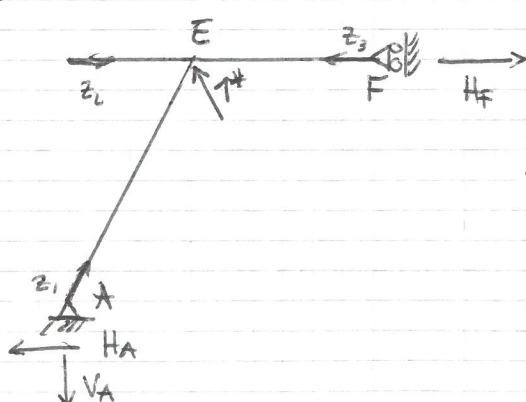


T [N]



M [N·m]

SISTEMA 1



$$1_x = 1 \cdot \cos \alpha = 0.45$$

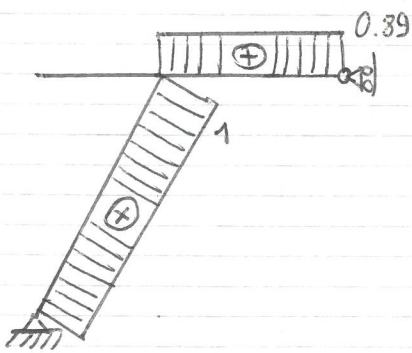
$$1_y = 1 \cdot \sin \alpha = 0.89$$

$$A) -H_F 2l + 1^* \cos \alpha \cdot 2l + 1^* \sin \alpha \cdot l = 0$$

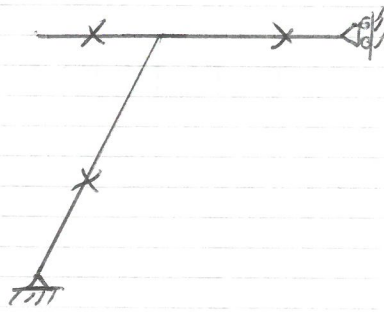
$$H_F = 0.89$$

$$H_F = H_A - 1^* \cos \alpha$$

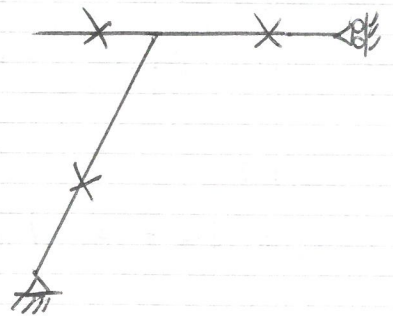
$$V_A = 1^* \sin \alpha$$



$N [N]$

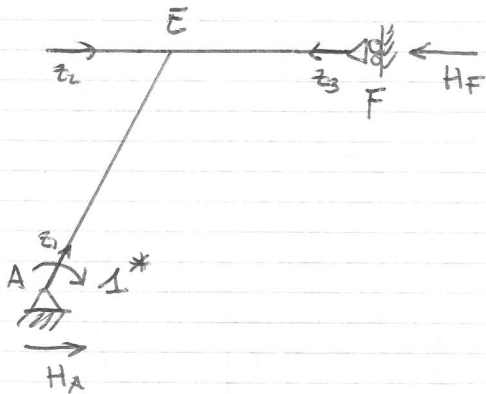


$T [N]$



$M [Nm]$

SISTEMA 2



$$A) -1 + H_F \cdot 2l = 0 \Rightarrow H_F = \frac{1}{2l} = \frac{1}{6}$$

$$H_F = H_A$$

$$V_A = 0$$

$$z_1 \Rightarrow N(z_1) = -H_A \cos \alpha = 0.07 \text{ N}$$

$$T(z_1) = -H_A \sin \alpha = 0.14 \text{ N}$$

$$M(z_1) = 1 - H_A \sin \alpha z$$

$$z_2 \Rightarrow N(z_2) = 0$$

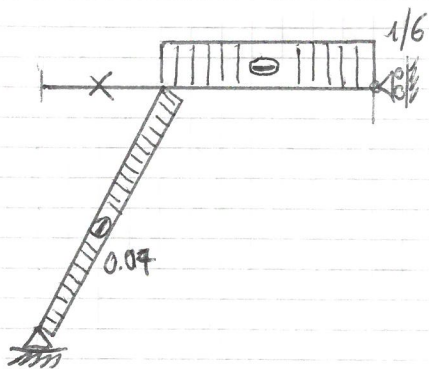
$$T(z_2) = 0$$

$$M(z_2) = 0$$

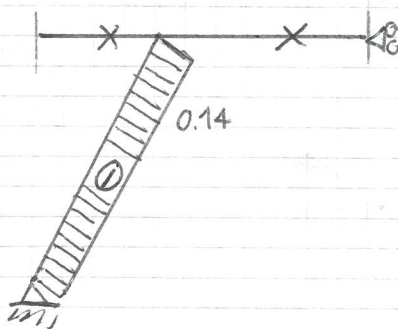
$$z_3 \Rightarrow N(z_3) = -1/6$$

$$T(z_3) = 0$$

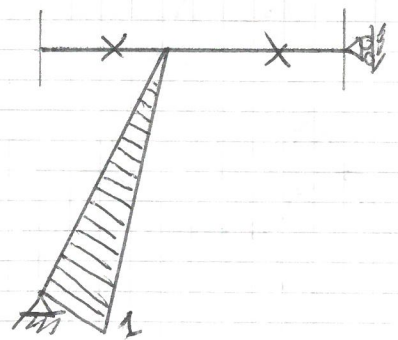
$$M(z_3) = 0$$



$N [N]$



$T [N]$



$M [Nm]$

$$\eta_{10} = 0$$

$$\eta_{20} = \left[\int_0^{(l/\cos \alpha)} (2ql \cos \alpha z - \frac{z^2}{16} ql \sin \alpha z) \left(1 - \frac{1}{6} \sin \alpha z\right) dz \right] \frac{1}{EJ} = -\frac{18855}{EJ}$$

$$\eta_{11} = 0$$

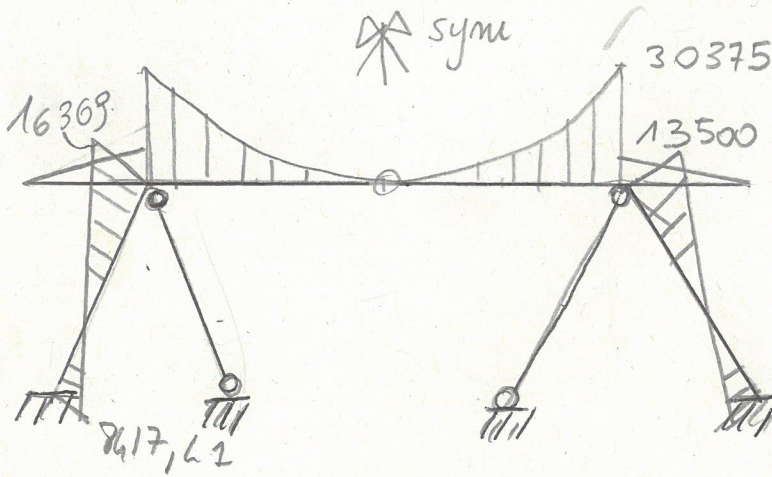
$$\eta_{20} = \left[\int_0^{(l/\cos \alpha)} \left(1 - \frac{1}{6} \sin \alpha z\right)^2 dz \right] = \frac{2.24}{EJ}$$

$$\eta_{21} = 0$$

$$\begin{vmatrix} \eta_{11} & \eta_{12} \\ \eta_{12} & \eta_{22} \end{vmatrix} \begin{vmatrix} x_1 \\ x_2 \end{vmatrix} = \begin{vmatrix} 0 \\ 0 \end{vmatrix} \Rightarrow$$

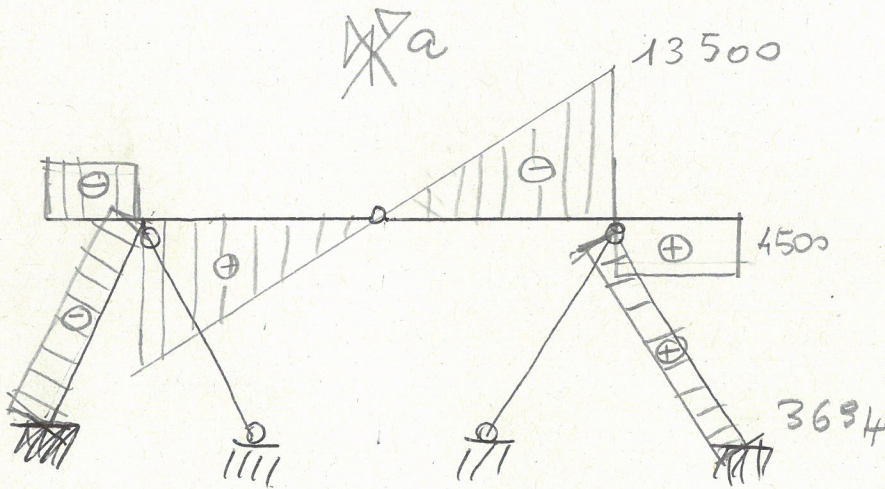
$$x_2 = 8417,41 \text{ Nm}$$

$$x_1 \text{ \u00e8 indeterminato}$$

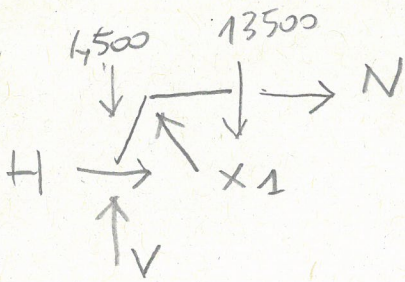
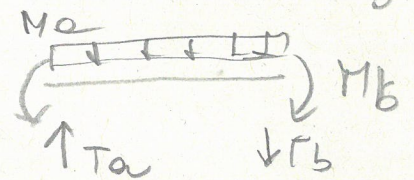


(M) [Nm]

Nota il M nuovo
 il T per equilibrio
 alla rotazione dei
 vari tratti: e.g.



(T)



$$V = 18000 - x_1 \sin \alpha = 18000 - 0,89 x_1$$

$$H = 11812,5 - x_1 \cos \alpha + x_2 \times 0,167$$

$$= 11812,5 - 0,45 x_1 + 1402,9 =$$

$$= 13212,4 - 0,45 x_1$$

$$\uparrow) 18000 - 0,89 x_1 - 4500 + x_1 0,89 - 13500 = 0 \text{ ok}$$

$$\rightarrow) 13212,4 - 0,45 x_1 - 0,45 x_1 + N = 0 \Rightarrow N = -13212,4 - 0,9 x_1$$

Non riesco a determinare N ed x_1 indipendentemente
 L'istituto principale che ho scelto non consente di
 trovare x_1

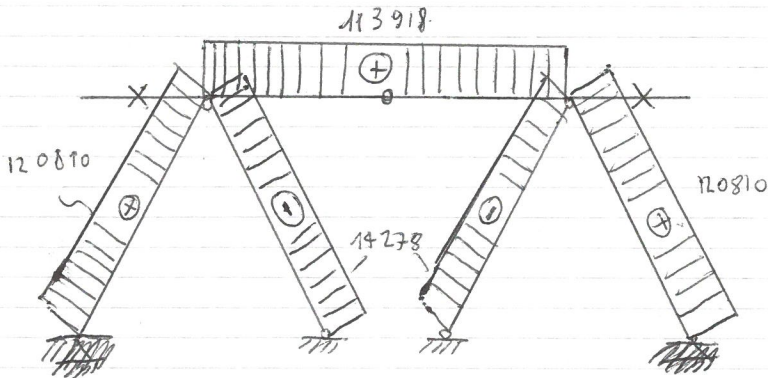
2) DEFORMABILITÀ ASSIALE BIELLA

$$\eta_{11}^{NEW} = \eta_{11}^{OLD} + \eta_{11}^{biella} = 0 + \int_0^{3/6m\alpha} (-1) \frac{1}{EA} dz = \frac{6.707}{EA}$$

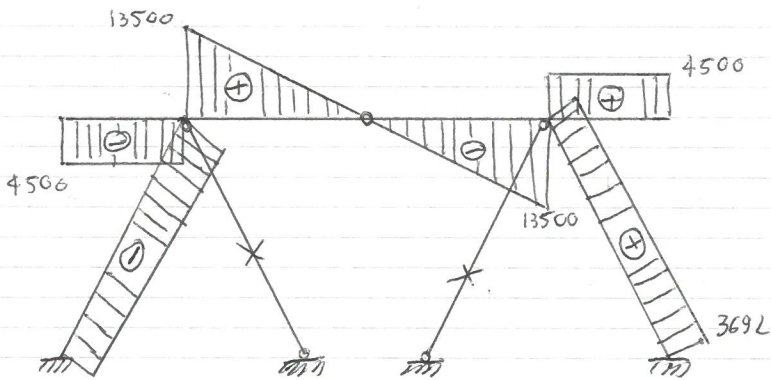
DEFORMABILITÀ ASSIALE BIELLA + CARICO TERMICO

$$\begin{cases} \eta_{11}^{NEW} X_1 + \eta_{12} X_2 + \eta_{10} + \int_0^{3/6m\alpha} (\alpha \Delta T) \cdot (-1) dz = 0 \\ \eta_{12} X_1 + \eta_{22} X_2 + \eta_{20} = 0 \end{cases}$$

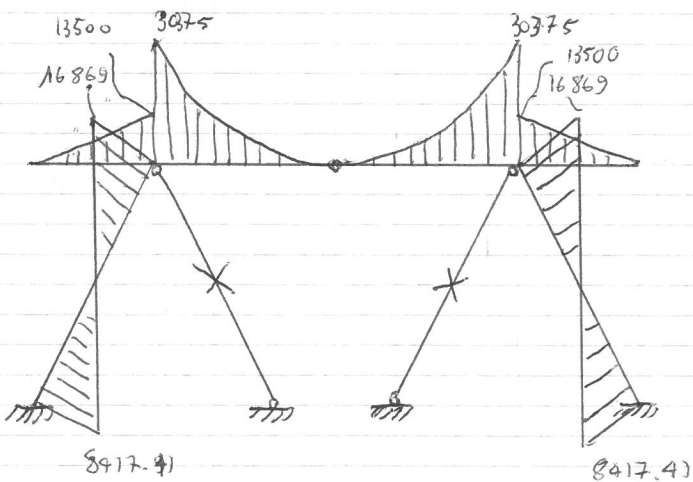
$$\begin{cases} X_1 = 142783 \text{ N} \\ X_2 = 8417.41 \text{ N}\cdot\text{m} \end{cases}$$



N [N]



T [N]



M [N·m]