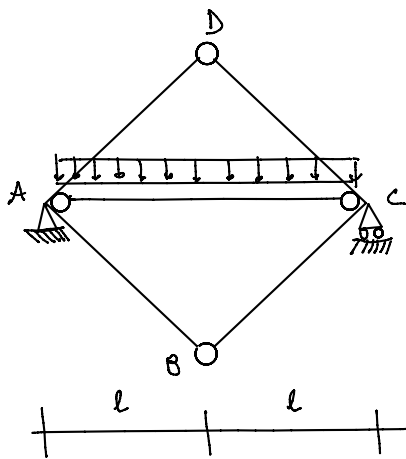




$$l = 4\text{ m}$$

$$q = 2000\text{ kN/m}$$

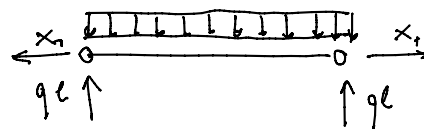
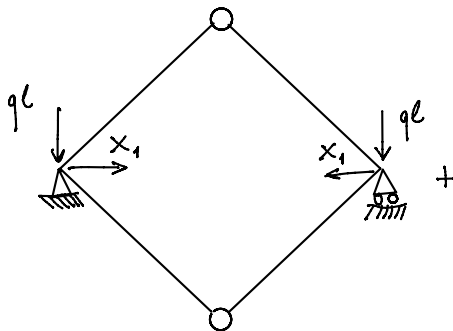
$$E = 210000\text{ MPa}$$

$$\alpha = 1.2 \cdot 10^{-5}\text{ }^{\circ}\text{C}^{-1}$$

$$\Delta T = 20^{\circ}\text{C}$$

$$\text{IPE 160} \quad J_x = 869\text{ cm}^4 \quad A = 20.1\text{ cm}^2$$

Struttura 1 volta iperstatica

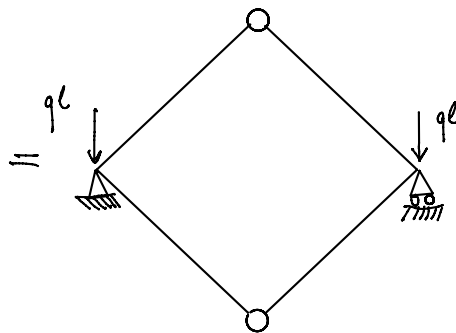
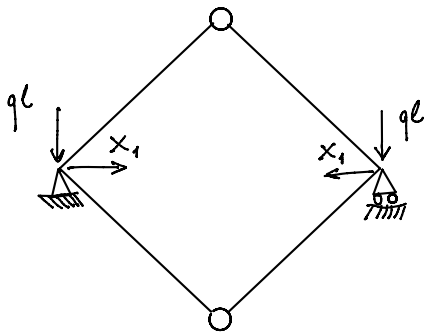


$$L_{ve} = -\frac{x_1 2l}{EA} - 1 \cdot 2l \alpha \Delta T$$

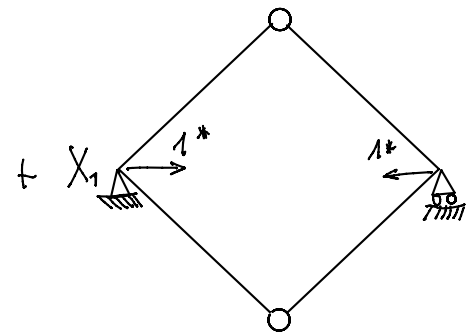
$$M_{max} = \frac{q(2l)^2}{8} = \frac{q l^2}{2} = 16000\text{ N/m}$$

$$T = 8000\text{ N}$$

1) Trascurando la deformabilità assiale

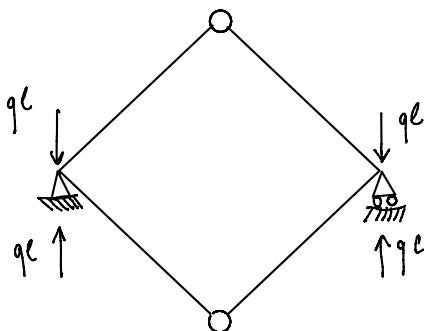


Sistema 0



Sistema 1

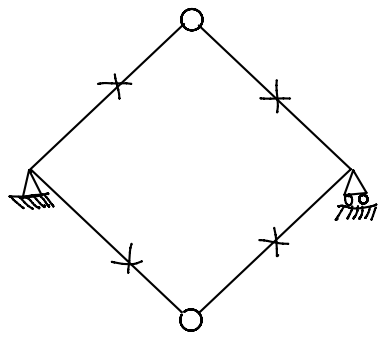
Sistema 0



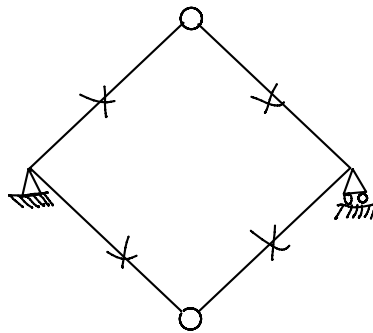
$$V_A = ql$$

$$V_C = ql$$

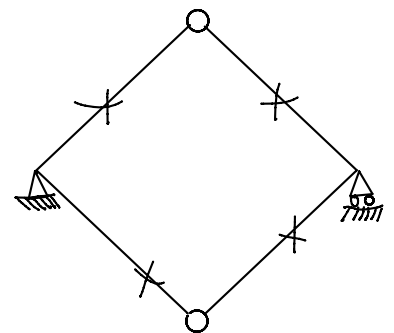
I diagrammi per le sollecitazioni N, T, M sono pari a zero



$M [N.m]$

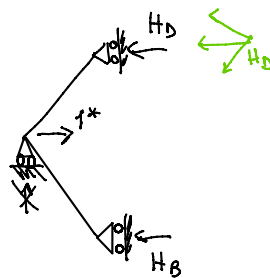
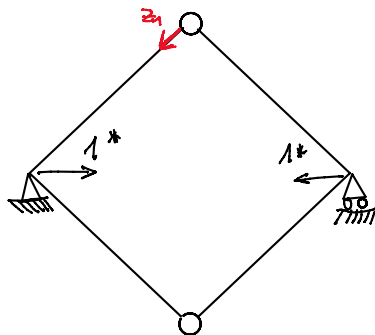


$T [N]$



$N [N]$

Sistema 1



$$\sum \rightarrow -H_D \cdot 2l + 1l = 0$$

$$H_D = \frac{1}{2}$$

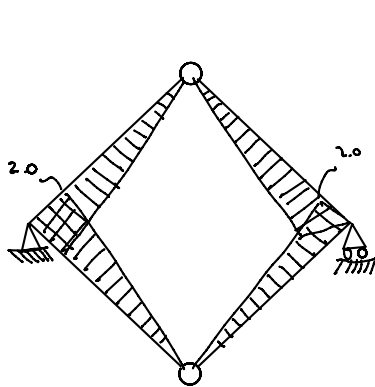
$$H_B = \frac{1}{2}$$

$$M(z_1) = \frac{1}{2} \cdot \frac{\sqrt{2}}{2} z_1$$

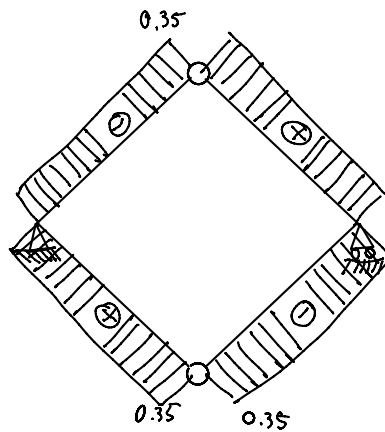
$$M(z_1 = \sqrt{2}l) = \frac{l}{2} = 2.0$$

$$T(z_1) = \frac{\sqrt{2}}{2} \cdot \frac{1}{2} = -\frac{\sqrt{2}}{4} = -0.35$$

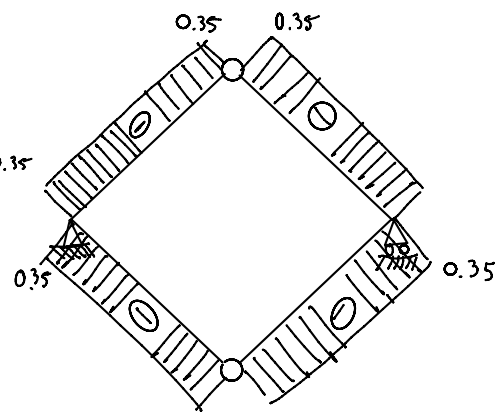
$$N(z_1) = -\frac{\sqrt{2}}{2} \cdot \frac{1}{2} = -\frac{\sqrt{2}}{4} = -0.35$$



$M [N.m]$



$T [N]$



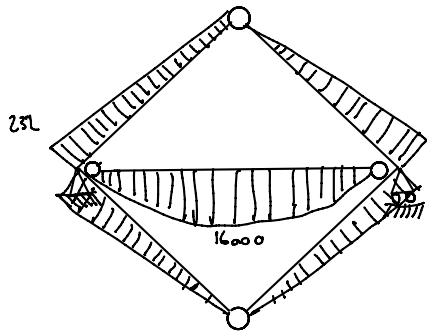
$N [N]$

$$\eta_{10} \approx 0$$

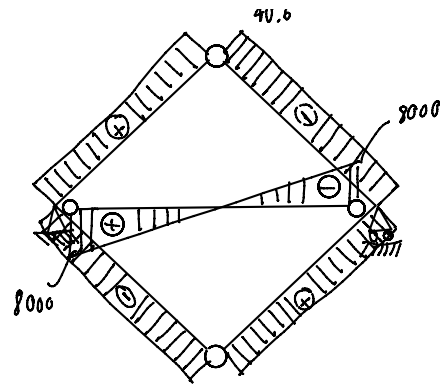
$$\eta_{11} = \frac{4}{EJ} \int_0^{\sqrt{2}l} \left(\frac{\sqrt{2}}{4} z_1 \right)^2 dz_1 = \frac{30.16}{EJ}$$

$$\eta^T = \int_0^{\sqrt{2}l} 1 \alpha (\Delta T) dz_1 = 1 \alpha \Delta T 2l = 1.92 \cdot 10^{-3}$$

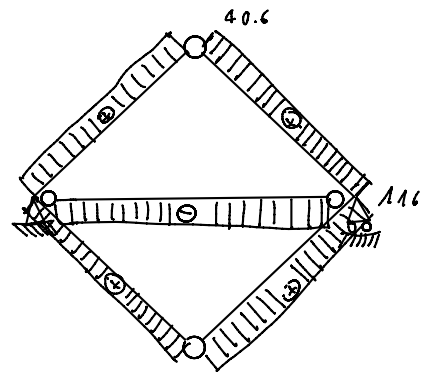
$$\eta_{11} x_1 = -\eta_{10} - \eta^T \longrightarrow \eta_{11} x_1 = -\eta^T \quad x_1 = -116 N$$



M [N.m]



T [N]



N [N]

2) Deformabilitate anisole

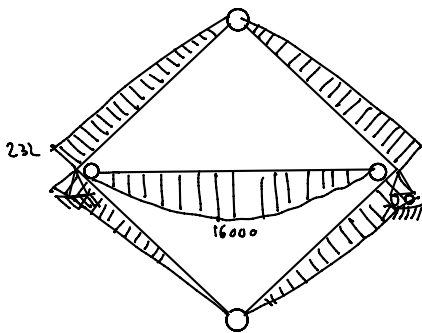
$$\gamma_{10}^{NGW} = \gamma_{10} = 0$$

$$\gamma_{11}^{NGW} = \gamma_{11} + \frac{4}{EA} \left[\int_0^{\sqrt{3}L} \left(-\frac{\sqrt{2}}{4} \right)^2 dz \right] + \frac{1}{EA} \cdot 2L = \gamma_{11} + \frac{10.82}{EA} = \frac{30.16}{EA} + \frac{10.82}{EA}$$

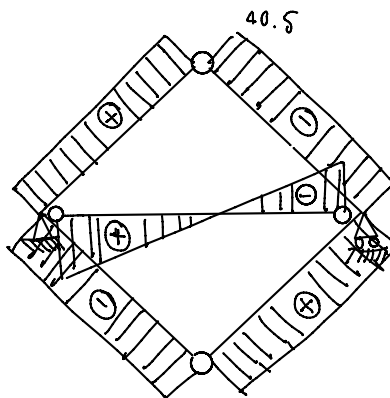
$$\gamma^T = \gamma^T$$

constanță anisole este ca
cazurile de deformabilitate

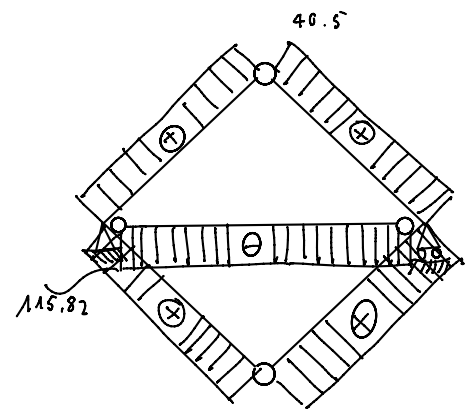
$$\gamma_{11}^{NGW} X_1 = -\gamma_{10} - \gamma^T \Rightarrow \gamma_{11}^{NGW} X_1 = -\gamma^T \quad X_1 = -115.82 \text{ N}$$



M [N.m]



T [N]



N [N]