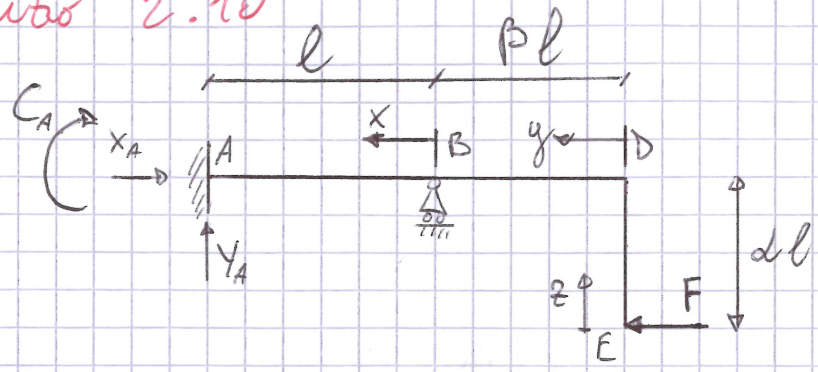
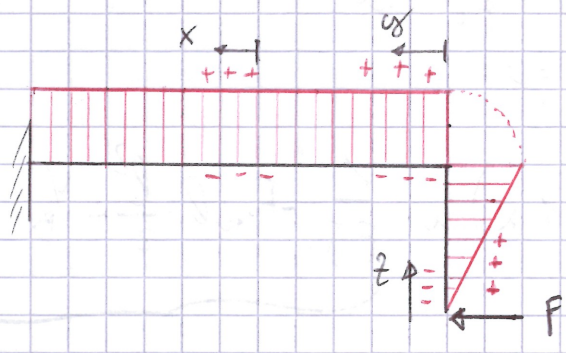
Esercizio 2.10



Per risolvere la struttura, parto dalla struttura principale caricata dal solo carico concentrato F.



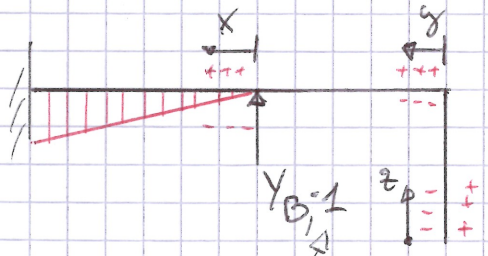
Mi accorgo che non è necessario determinare, in questo specifico caso, le reazioni vincolari.

$$M_{f_F}(x) = F \cdot \alpha l$$

$$M_{f_F}(y) = F \cdot \alpha l$$

$$M_f(z) = F \cdot z$$

Considero ora la struttura principale caricata dalla reazione Y_B.



$$M_{f_{Y_B}}(x) = -Y_B \cdot x$$

$$M_{f_{Y_B}}(y) = 0$$

$$M_{f_{Y_B}}(z) = 0$$

la forza esploratrice →

$$M_{f_1}(x) = -1 \cdot x$$

$$M_{f_1}(y) = 0$$

$$M_{f_1}(z) = 0$$

Applico il PLV

$l_i = l_e$

$l_e = 1 \cdot \phi = 0$

rotazione in B

$$l_i = \int_0^{l} \frac{1}{EJ}\left(M_{f_F}(x) + M_{f_{Y_B}}(x)\right) \cdot M_{f_1}(x)\,dx + \int_0^{\beta l} \frac{1}{EJ}\left(M_{f_F}(y) + M_{f_{Y_B}}(y)\right) \cdot M_{f_1}(y)\,dy +$$

$$+ \int_0^{\alpha l} \frac{1}{EJ}\left(M_{f_F}(z) + M_{f_{Y_B}}(z)\right) \cdot M_{f_1}(z)\,dz$$

$$= \int_0^{l} \frac{1}{EJ}\left(F \cdot \alpha l - Y_B \cdot x\right) \cdot (-1 \cdot x)\,dx = \underbrace{\frac{1}{EJ}\left(-F \cdot \alpha l \cdot \frac{l^2}{2} + Y_B \cdot \frac{l^3}{3}\right)}_{= l_e = 0}$$

$$\frac{1}{EJ}\left(-F \cdot \alpha l \cdot \frac{l^2}{2} + Y_B \cdot \frac{l^3}{3}\right) = 0 \quad \rightarrow \quad -\alpha F \cdot \frac{1}{2} + Y_B \cdot \frac{1}{3} = 0$$

$$\rightarrow Y_B = \alpha \cdot \frac{3}{2} \cdot F$$