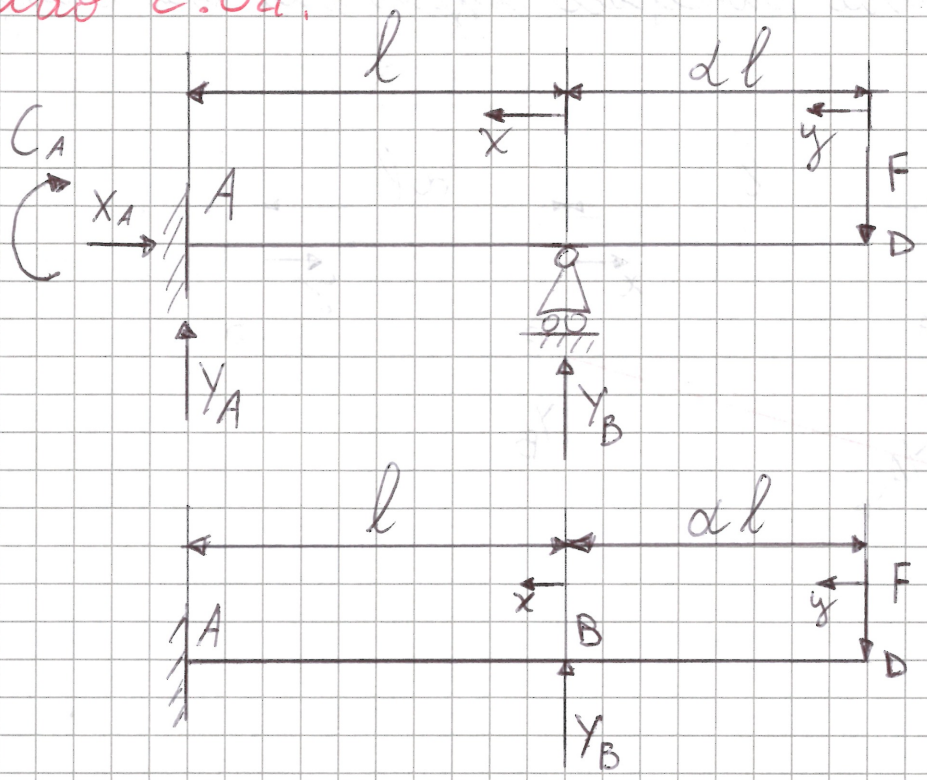
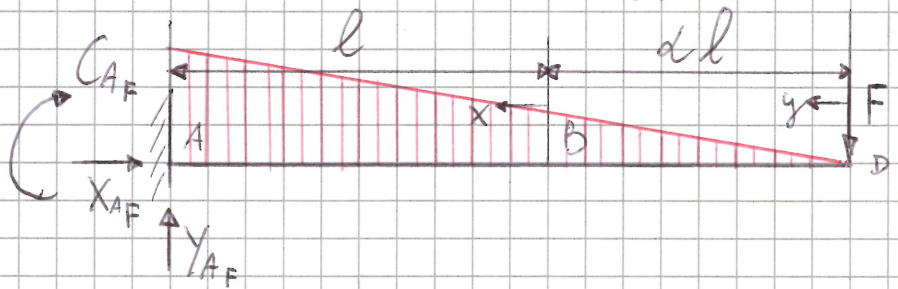
Esercizio 2.04.



Calcolo la struttura principale soggetta alla sola forza F.



$$\rightarrow] \quad X_{A_F} = 0$$

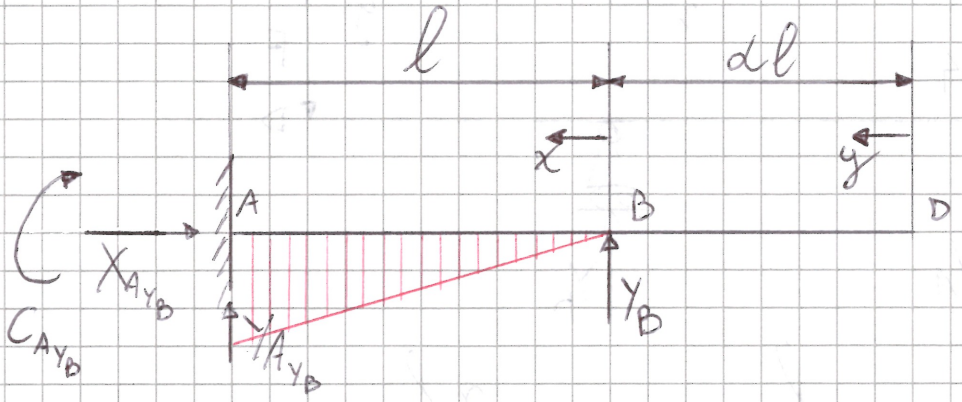
$$\uparrow] \quad Y_{A_F} = F$$

$$\circlearrowleft_A] \quad C_{A_F} = -Fl(\alpha+1)$$

$$M_{f_{AB,F}}(x) = F \cdot \alpha l + F \cdot x$$

$$M_{f_{DB,F}}(y) = F \cdot y$$

Calcolo la struttura principale soggetta alla sola incognita iperstatica Y_B.



$\rightarrow$] $X_{AY_B} = 0$

$\uparrow$] $Y_{AY_B} = -Y_B$

$\curvearrowleft_A$] $C_{AY_B} = Y_B \cdot \ell$

$M\ell_{BA}(x) = -Y_B \cdot x$

$M\ell_{DB}(y) = 0$

Calcolo U:

$$U = \frac{1}{2EJ}\left[\int_0^{\ell} (F\alpha\ell + F\cdot x - Y_B \cdot x)^2 dx + \int_0^{\alpha\ell} (F\cdot y)^2 dy\right] =$$

$$= \frac{1}{2EJ}\left[\int_0^{\ell} \left(F^2\alpha^2\ell^2 + F^2x^2 + Y_B^2x^2 + 2F^2\alpha\ell x - 2\cdot\alpha\ell F Y_B x - 2F Y_B x^2\right)dx + \right.$$

$$\left. + \int_0^{\alpha\ell} (F^2y^2)\,dy\right] =$$

$$= \frac{1}{2EJ}\left[F^2\alpha^2\ell^3 + F^2\frac{\ell^3}{3} + Y_B^2\frac{\ell^3}{3} + 2F^2\alpha\frac{\ell^3}{2} - \frac{2\alpha\ell^3 F Y_B}{2} - \frac{2FY_B\ell^3}{3} + \frac{F^2\alpha^3\ell^3}{3}\right]$$

$$\frac{\partial U}{\partial Y_B} = \delta_B = 0 = \frac{1}{2EJ}\left(0 + 0 + 2Y_B\frac{\ell^3}{3} + 0 - \alpha\ell^3 F - \frac{2}{3}F\ell^3 + 0\right)$$

$$\rightarrow Y_B = F\left(\frac{\alpha + \frac{2}{3}}{\frac{2}{3}}\right) = \frac{3}{2}F\cdot\alpha + F$$

$$X_A = 0$$

$$Y_A = F - Y_B = F\left(\frac{\frac{2}{3} - a - \frac{2}{3}}{\frac{2}{3}}\right) = -a \cdot F \cdot \frac{3}{2}$$

$$C_A = -Fl(a+l) + F \cdot l \cdot \left(\frac{a + \frac{2}{3}}{\frac{2}{3}}\right) = Fl\frac{3}{2}\left(a + \frac{2}{3} - \frac{2}{3}a - \frac{2}{3}\right) =$$

$$= F \cdot l\left(\frac{1}{2}a\right)$$