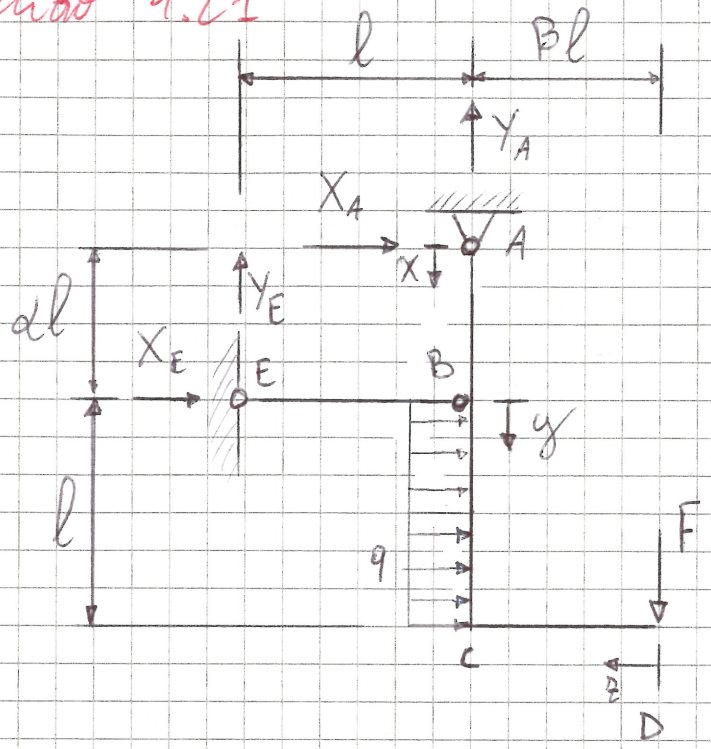
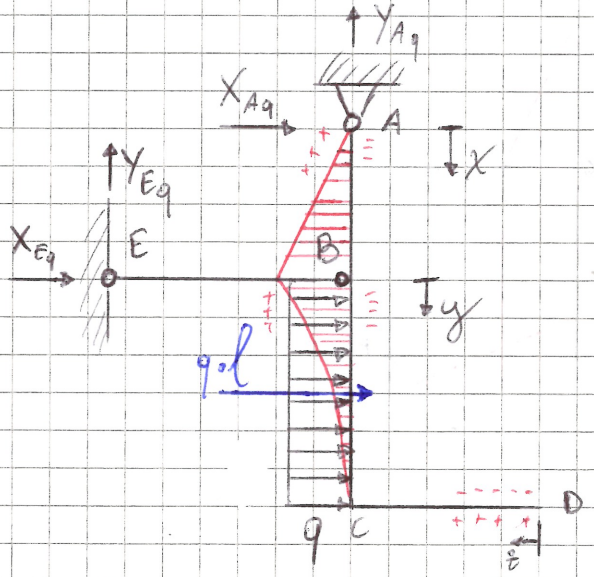
Esercizio 1.21



Risolvo la struttura considerando il solo carico distribuito q.



Per il calcolo delle reazioni vincolari uso la risultante del carico q: q·l.
Uso le eq. di equilibrio per questa struttura staticamente determinata.

$$\rightarrow^{+}] \quad X_{Eq} + q\cdot l + X_{Aq} = 0 \rightarrow X_{Eq} = -q\cdot l - ql\frac{1}{2\alpha} = -q\cdot l\left(\frac{2\alpha+1}{2\alpha}\right)$$

$$\uparrow^{+}] \quad Y_{Eq} + Y_{Aq} = 0 \xrightarrow{②} Y_{Aq} = 0$$

$$+\circlearrowleft_B] \quad q\cdot l\cdot\frac{l}{2} - X_{Aq}\cdot\alpha l - Y_{Eq}\cdot l = 0 \xrightarrow{①} X_{Aq} = q\cdot l\cdot\frac{1}{2\alpha}$$

Noto che EB è una bielletta. $\rightarrow$ $\xrightarrow{②} Y_{Eq} = 0$

Traccio il grafico di M_{f_q} e lo descrivo analiticamente:

$$M_{f(x)_q} = +q\cdot l\cdot\frac{1}{2\alpha}\cdot x$$

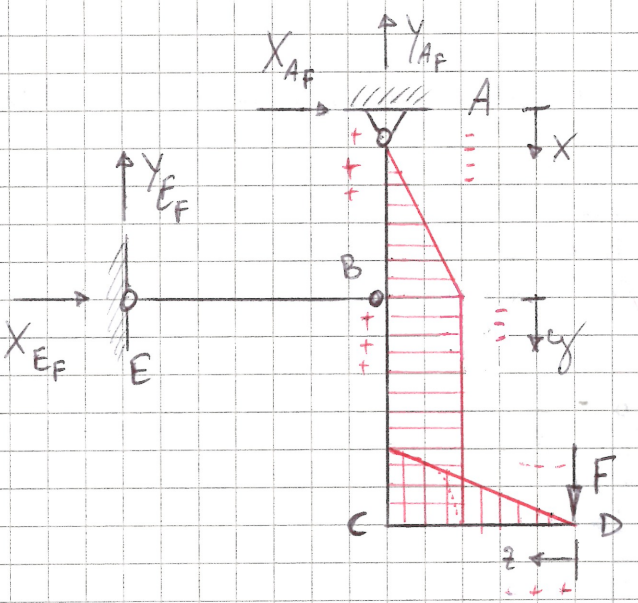
$$M_{f(y)_q} = q\cdot l\,\frac{1}{2\alpha}\cdot(y+\alpha l) - q\cdot l\left(\frac{2\alpha+1}{2\alpha}\right)\cdot y + q\cdot\frac{y^2}{2} =$$

$$= q\,y^2\cdot\frac{1}{2} + q\,l\cdot y\left(\frac{1}{2\alpha}-\frac{2\alpha+1}{2\alpha}\right) + q\,l^2\cdot\frac{\alpha}{2\alpha} =$$

$$= q\,y^2\cdot\frac{1}{2} + q\,l\cdot y(-1) + q\,l^2\cdot\frac{1}{2}$$

$M_{f(z)_q} = 0$

Risolvo la struttura considerando il solo carico concentrato F.



Utilizzo le eq. di equilibrio

$$\rightarrow^{+}\ ] \quad X_{EF} + X_{AF} = 0 \xrightarrow{①} X_{EF} = F\cdot\frac{\beta}{\alpha}$$

$$\uparrow^{+}\ ] \quad Y_{EF} + Y_{AF} - F = 0 \xrightarrow{②} Y_{AF} = F$$

$$+\circlearrowleft_{B}\ ] \quad -F\cdot\beta l - Y_{EF}\cdot l - X_{AF}\cdot\alpha l = 0 \xrightarrow{③} X_{AF} = -F\cdot\frac{\beta}{\alpha}$$

Notoche EB è una biellette: $\}\ Y_{EF} \overset{①}{=} 0$

Bisogna calcolare M_F analitica:

$$M_{f(x)_F} = F \cdot x \cdot \left(-\frac{\beta}{\alpha}\right)$$

$$M_{f(y)_F} = F \cdot \left(-\frac{\beta}{\alpha}\right) \cdot (\alpha l + y) + F \cdot \left(\frac{\beta}{\alpha}\right) \cdot y =$$

$$\overset{!}{=} F \cdot l \cdot (-\beta)$$

$$M_{f(z)_F} = -F \cdot z$$