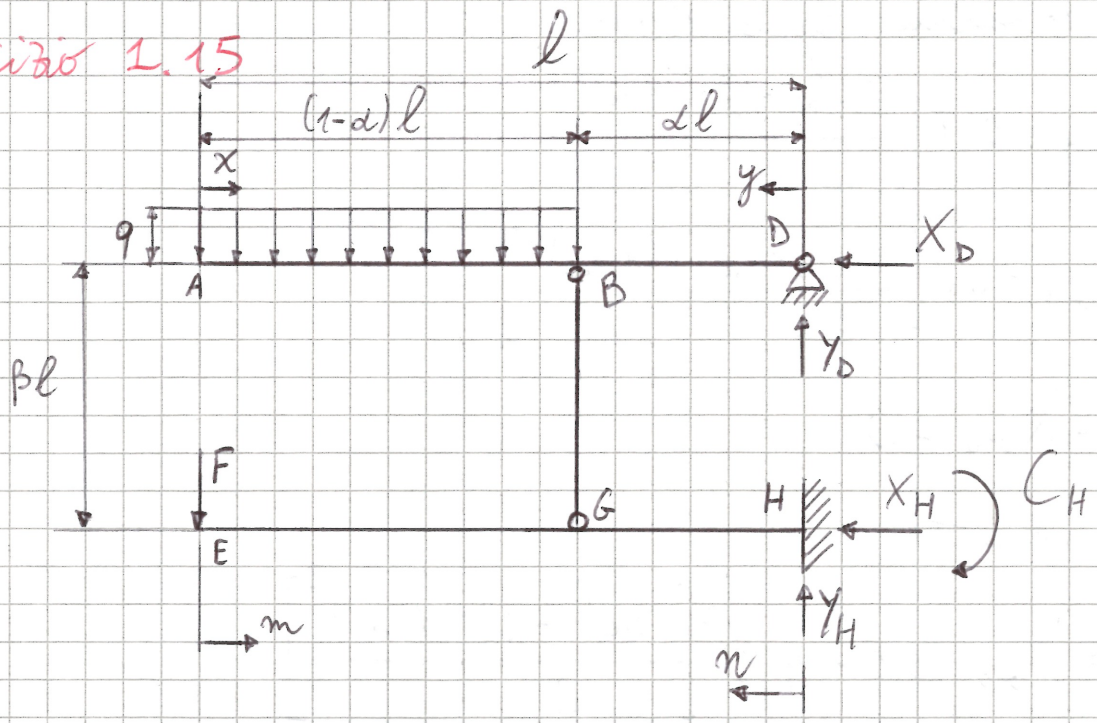
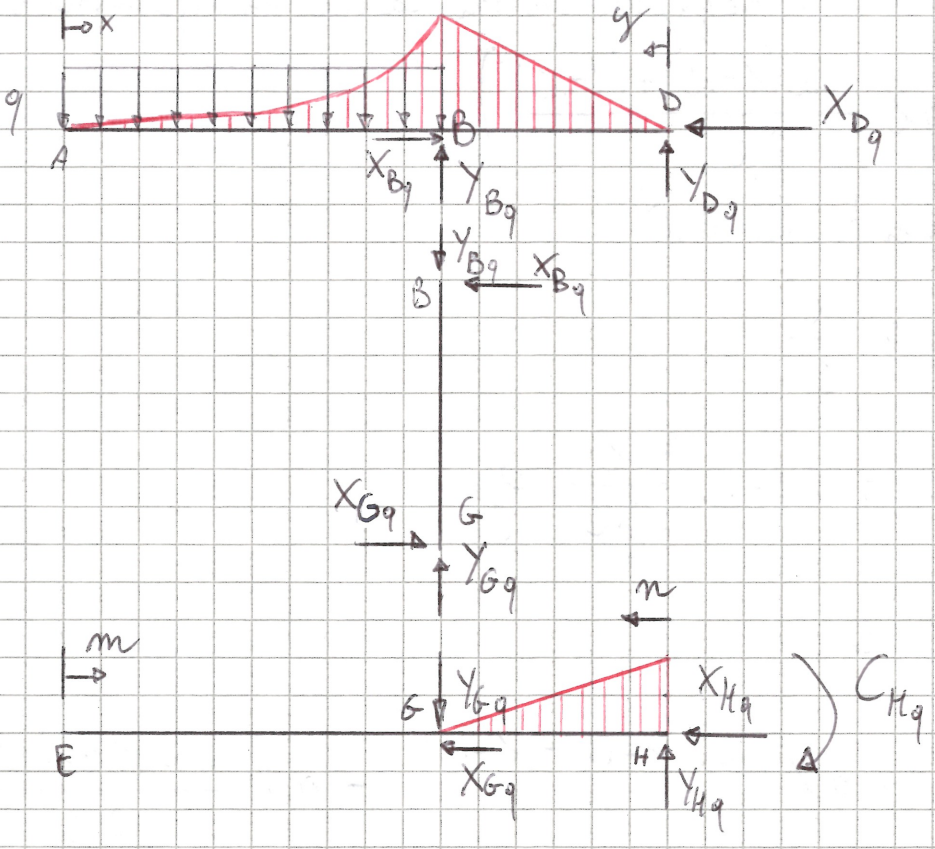
Esercizio 1.15



Calcolo reazioni vincolari e M_f quando è applicato solo q.



Trave ABD

$\rightarrow] \; X_{Dq} = X_{Bq} \rightarrow X_{Dq} = 0$

$\uparrow] \; q(1-\alpha)l - Y_{Bq} - Y_{Dq} = 0 \rightarrow Y_{Bq} = q \cdot l\left[(1-\alpha) + (1-\alpha)^2 \cdot \frac{1}{2\alpha}\right]$

$\circlearrowleft B)] \; q(1-\alpha)l \cdot \frac{(1-\alpha)l}{2} = -Y_{Dq} \cdot \alpha l \rightarrow Y_{Dq} = -q(1-\alpha)^2 \cdot \frac{l}{2\alpha}$

BG è una biella $\Rightarrow X_{Bq} = 0$

Mi concentro sulla trave EGH.

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

$\uparrow$] $Y_{H,q} - Y_{G,q} = ql \left[\frac{2\alpha(1-\alpha) + (1-\alpha)^2}{2\alpha} \right]$

$\rightarrow$] $X_{H,q} = -X_{G,q} = 0$

BIELLETTA

$\circlearrowleft_H$] $C_{H,q} = Y_{G,q} \cdot \alpha l = q \cdot l^2 \left[\frac{2\alpha(1-\alpha) + (1-\alpha)^2}{2} \right]$

La bielletta BG è soggetta ad un carico compressivo:

$$N_{BG,q} = -ql \left(\frac{2\alpha(1-\alpha) + (1-\alpha)^2}{2\alpha} \right)$$

Calcolo i momenti flettenti.

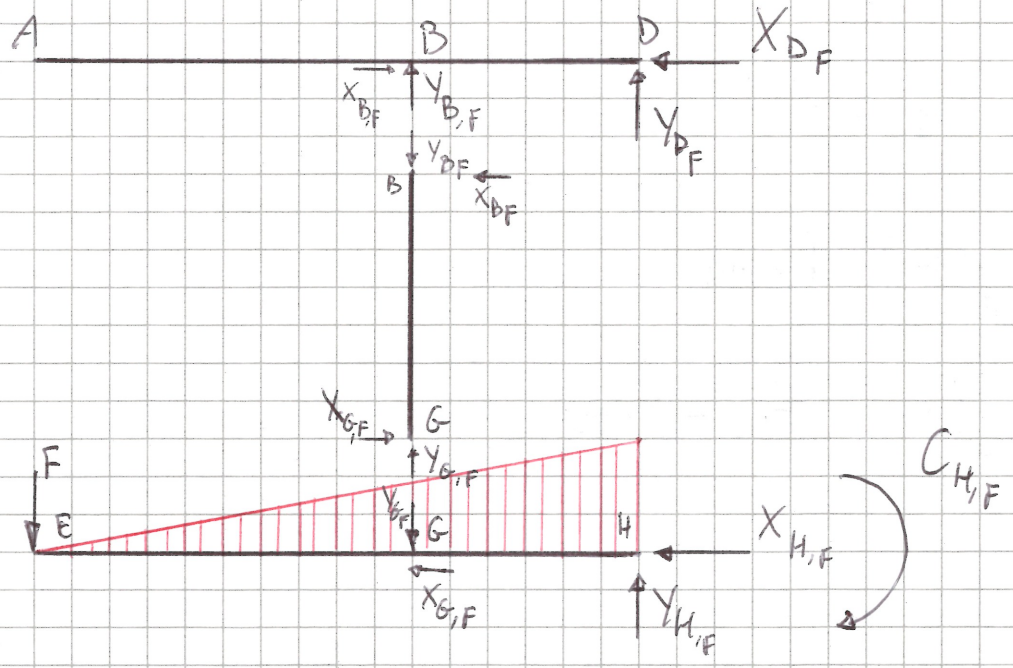
$$M_{f\,AB,q}(x) = q \cdot \frac{x^2}{2};$$

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

$$M_{f\,EG,q}(m) = 0$$

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

Considero ora il carico concentrato F.



Parto dalla bielletta BG:

$$X_{G,F} = X_{B,F} = 0$$

Vado alla trave ABD.

$$\circlearrowright_D \; Y_{B,F} \cdot 2l = 0 \rightarrow Y_{B,F} = 0$$

$$\uparrow \; Y_{D,F} = -Y_{B,F} = 0 \quad ; \quad \rightarrow \; X_{D,F} = Y_{B,F} = 0$$

$$\rightarrow Y_{G,F} = 0 \rightarrow N_{BG,F} = 0$$

Vado alla trave EGH.

$$\uparrow \; F + Y_{G,F} = Y_{H,F} \rightarrow Y_{H,F} = F$$

$$\rightarrow \; X_{H,F} = 0 \; (= X_{G,F})$$

$$\circlearrowright_H \; F \cdot l + \cancel{Y_{G,F}^{0} \cdot 2l} = C_{H,F} \rightarrow C_{H,F} = F \cdot l$$

Calcolo $M_{f,F}$

$M_{f_{AB,F}}(x) = 0$

$M_{f_{DB,F}}(y) = 0$

$M_{f_{EG,F}}(m) = F \cdot m$

$M_{f_{HG,F}}(n) = F \cdot l - F \cdot n$