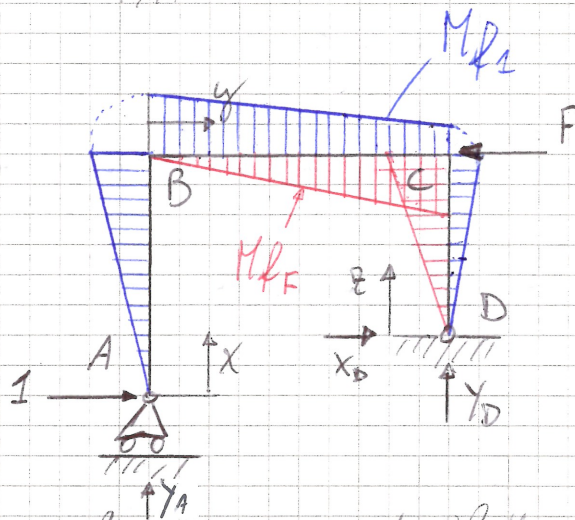
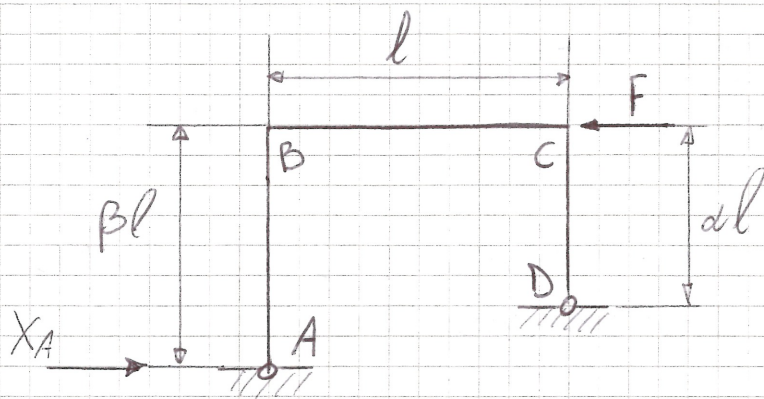


Compito del 14/02/2023. Esercizio 2.



Prima di calcolare i momenti flettenti, calcolo le reazioni vincolari.

• sola forza esterna F.

$$\uparrow + \int Y_{A_F} + Y_{D_F} = 0 \rightarrow Y_{D_F} = -Y_{A_F} = -F \cdot \alpha$$

$$\rightarrow + \int X_{D_F} - F = 0 \rightarrow X_{D_F} = F$$

$$\curvearrowright + \int D \int + F \cdot \alpha \cdot l - Y_{A_F} \cdot l = 0 \rightarrow Y_{A_F} = F \cdot \alpha$$

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

$$M_{F,BC}(y) = Y_{A_F} \cdot y = F \cdot \alpha \cdot y$$

$$M_{F,DC}(z) = X_{D_F} \cdot z = F \cdot z$$

• sola azione esploratrice "1".

$$\uparrow + \int Y_{A_1} + Y_{D_1} = 0 \rightarrow Y_{D_1} = -Y_{A_1} = 1 \cdot (\alpha - \beta)$$

$$\rightarrow + \int 1 + X_{D_1} = 0 \rightarrow X_{D_1} = -1$$

$$\curvearrowright + \int D \int 1 \cdot (\beta l - \alpha l) - Y_{A_1} \cdot l = 0 \rightarrow Y_{A_1} = 1 \cdot (\beta - \alpha)$$

$$M_{f,1,AB}(x) = -1 \cdot x$$

$$M_{f,1,BC}(y) = Y_{A1} \cdot y - 1 \cdot \beta l = 1(\beta - \alpha) \cdot y - 1 \cdot \beta l$$

$$M_{f,1,DC}(z) = X_{D1} \cdot z = -1 \cdot z$$

→ Nota la reazione vincolare, posso ricavare i Mf della struttura iperstatica. Considero che posso sostituire X_A a "1".

$$M_{fAB}(x) = M_{f_{FAB}}(x) + M_{f_{X_A}}(x) = 0 - X_A \cdot x$$

$$M_{fBC}(y) = M_{f_{FBC}}(y) + M_{f_{X_A}}(y) = F \cdot \alpha \cdot y + X_A(\beta - \alpha)y - X_A \cdot \beta l$$

$$M_{fDC}(z) = M_{f_{FDC}}(z) + M_{f_{X_A}}(z) = F \cdot z - X_A \cdot z$$

Calcolo:

$$M_{f,B} = M_{fBC}(y=0) = -X_A \cdot \beta l = M_{fAB}(x=\beta l)$$

$$M_{f,C} = M_{fBC}(y=l) = M_{fDC}(z=\alpha l) = F \cdot \alpha l - X_A \cdot \alpha l$$

$$\{r_{19}\} = 0 ; \{r_{20}\} = 0 ; \{r_{21}\} = 0 ; \{r_{22}\} = -1 ;$$

$$\{r_{23}\} = 0 ; \{r_{24}\} = \alpha ; \{r_{25}\} = -\beta ; \{r_{26}\} = \beta - \alpha$$

$$\{r_{27}\} = 0 ; \{r_{28}\} = 1 ; \{r_{29}\} = 0 ; \{r_{30}\} = -1 ;$$

$$\{r_{31}\} = \left| -\beta \cdot \frac{(2\alpha^2(\alpha+1) + \alpha\beta)}{(2\alpha^2(\alpha+1) + 2\beta^2(\beta+1) + 2\alpha\beta)} \right|$$

$$\{r_{32}\} = \left| \alpha - \alpha \cdot \frac{(2\alpha^2(\alpha+1) + \alpha\beta)}{(2\alpha^2(\alpha+1) + 2\beta^2(\beta+1) + 2\alpha\beta)} \right|$$