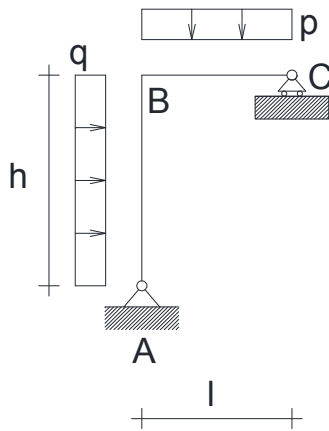


Acciaio: flessione e pressoflessione, esercizio N.1



Dimensionare e verificare la struttura in figura, assumendo che la trave sia realizzata con un profilato IPE ed il pialastro con un prefilato HE.

Dimensioni:

$$l := 1.5\text{m} \quad h := 2.5\text{m}$$

$$\text{Carico: } p := 200 \frac{\text{kN}}{\text{m}} \quad q := 50 \frac{\text{kN}}{\text{m}}$$

$$\text{Resistenza del materiale: } f_{yk} := 27\text{MPa} \quad f_{yd} := \frac{f_{yk}}{1.05} \quad f_{yd} = 25.714\text{MPa}$$

$$\text{Modulo elastico: } E_s := 210000\text{MPa}$$

$$Y_C := \left(q \cdot \frac{h^2}{2} + \frac{p \cdot l^2}{2} \right) \cdot \frac{1}{l} \quad Y_C = 254.167 \cdot \text{kN}$$

$$Y_A := p \cdot l - Y_C \quad Y_A = 45.833 \cdot \text{kN}$$

$$X_A := -q \cdot h \quad X_A = -125 \cdot \text{kN}$$

Forza Normale

$$N_{AB} := -Y_A \quad N_{AB} = -45.833 \cdot \text{kN}$$

$$N_{BC} := 0$$

Forza di Taglio

$$V_{AB}(x) := -X_A - q \cdot x \quad V_{AB}(0) = 1.25 \times 10^5 \hat{=} V_{AB}(2.5\text{m}) = 0 \text{ N}$$

$$V_{BC}(x) := Y_A - p \cdot x \quad V_{BC}(0) = 4.583 \times 1 \quad V_{BC}(1.5\text{m}) = -254.167 \cdot \text{kN}$$

Momento Flettente

$$M_{AB}(x) := -X_A \cdot x - q \cdot \frac{x^2}{2} \quad M_{AB}(0) = 0 \cdot \text{kN} \cdot \text{m} \quad M_{AB}(h) = 156.25 \cdot \text{kN} \cdot \text{m}$$

$$M_{BC}(x) := M_{AB}(h) + Y_A \cdot x - p \cdot \frac{x^2}{2} \quad M_{BC}(0) = 156.25 \cdot \text{kN} \cdot \text{m}$$

$$x_{\max} := \frac{Y_A}{p} \quad x_{\max} = 0.229 \text{ m}$$

$$M_{\max} := M_{BC}(x_{\max})$$

$$M_{\max} = 161.502 \cdot \text{kN} \cdot \text{m}$$

$$M_{BC}(1.5\text{m}) = 0 \cdot \text{kN} \cdot \text{m}$$

$$M_B := Y_C \cdot l - p \cdot \frac{l^2}{2} \quad M_B = 156.25 \cdot \text{kN} \cdot \text{m}$$

Dimensionamento e verifiche:

Trave BC:

$$W_{\min} := \frac{M_{\max}}{f_{yd}}$$

$$W_{\min} = 6.281 \times 10^3 \cdot \text{cm}^3$$

$$\text{IPE 330} \quad W_x := 713.1 \text{ cm}^3$$

$$\sigma_{\max} := \frac{M_{\max}}{W_x}$$

$$\sigma_{\max} = 226.478 \cdot \text{MPa}$$

PILASTRO AB:

$$W_{\min} := \frac{M_{AB}(h)}{f_{yd}}$$

$$W_{\min} = 6.076 \times 10^3 \cdot \text{cm}^3$$

$$\text{HEA 240} \quad A := 76.84 \text{cm}^2 \quad W_x := 675.1 \text{cm}^3 \quad J_x := 776.3 \text{cm}^4$$

$$\sigma_{\max} := \left(\frac{N_{AB}}{A} - \frac{M_{AB}(h)}{W_x} \right)$$

$$\sigma_{\max} = -237.412 \cdot \text{MPa}$$