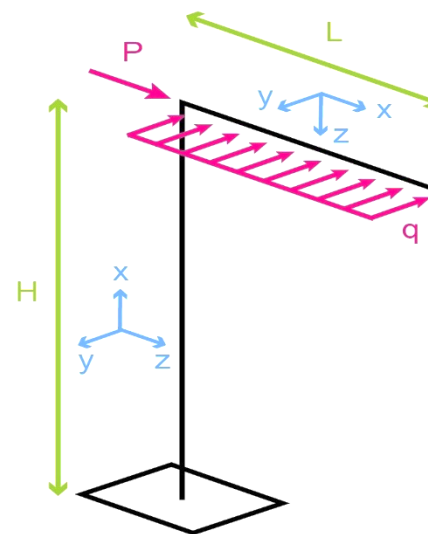
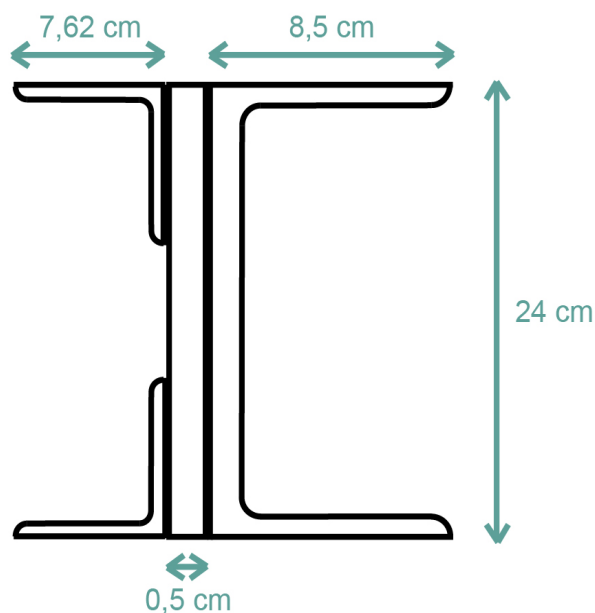




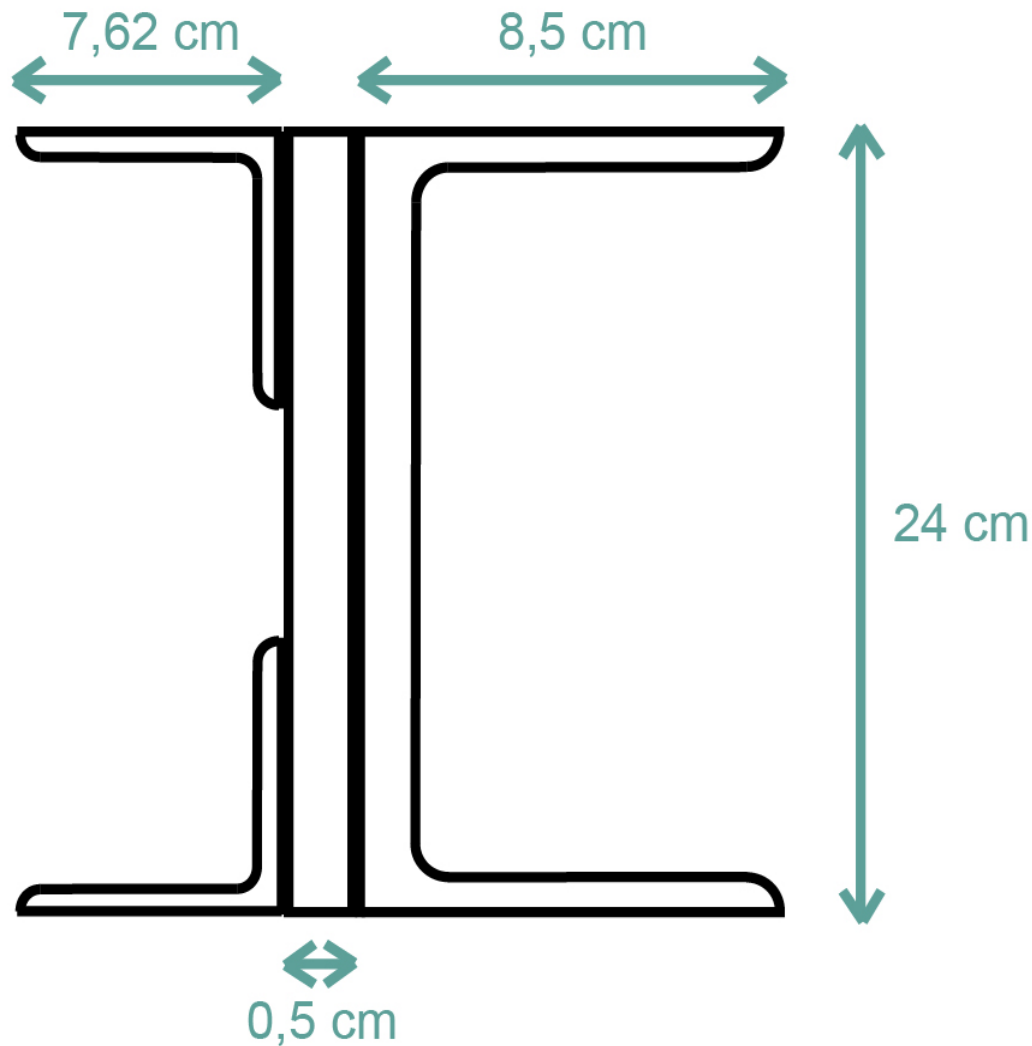
Repaso de Estabilidad I



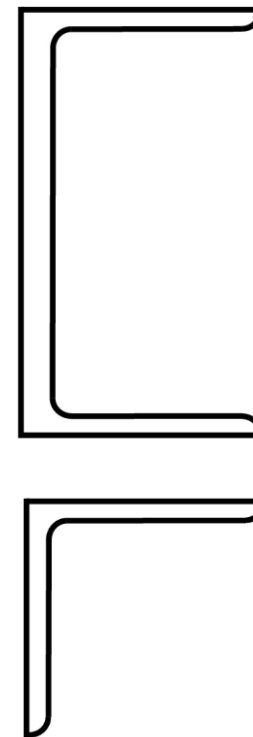
Catalina Urteneche - Clara Zaccaria



Geometría de las superficies



Ejercicio 1: Hallar el baricentro, y los momentos de inercia principales de la sección.



UPN 240

$$A = 42,3\text{cm}^2$$

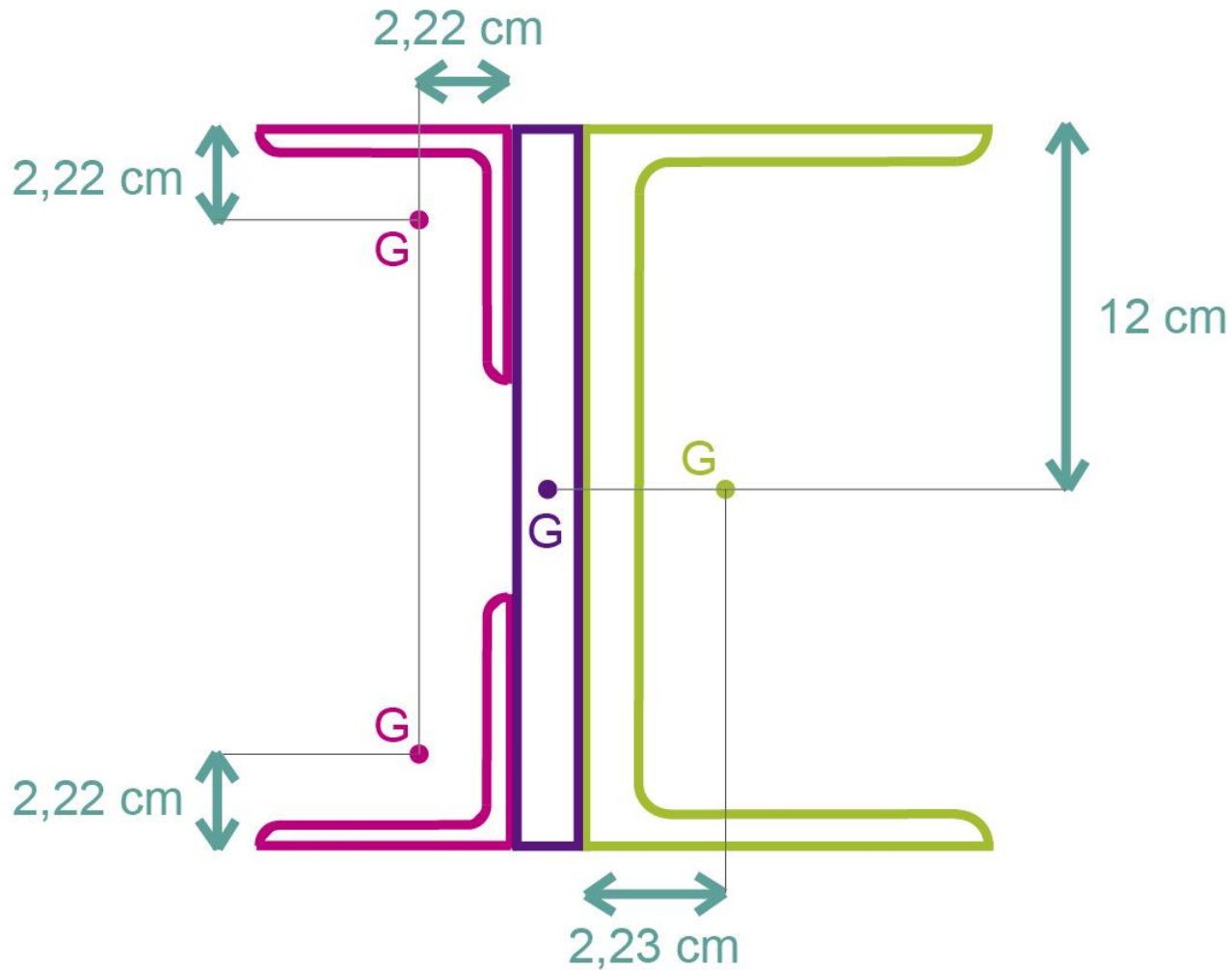
$$I_{MÁX} = 3600\text{cm}^4$$

$$I_{MÍN} = 248\text{cm}^4$$

3" × 3/8"

$$A = 13,64\text{cm}^2$$

$$I_x = I_y = 71,15\text{cm}^4$$



UPN 240

$$A = 42,3\text{cm}^2$$

$$I_{MÁX} = 3600\text{cm}^4$$

$$I_{MÍN} = 248\text{cm}^4$$

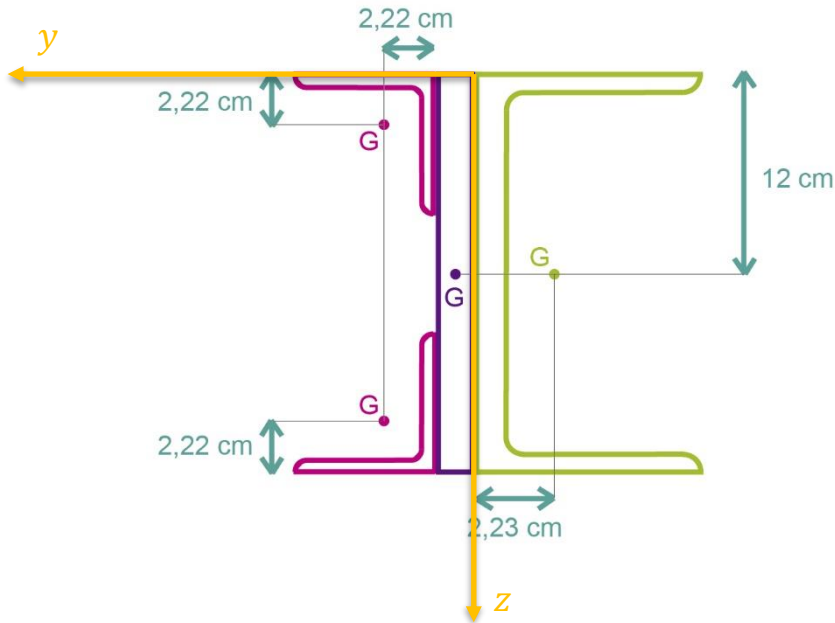
3" × 3/8"

$$A = 13,64\text{cm}^2$$

$$I_x = I_y = 71,15\text{cm}^4$$



Calculamos el momento estático para hallar el baricentro total:



$$S_z^{(A_t)} = \sum S_i^{(A_i)}$$

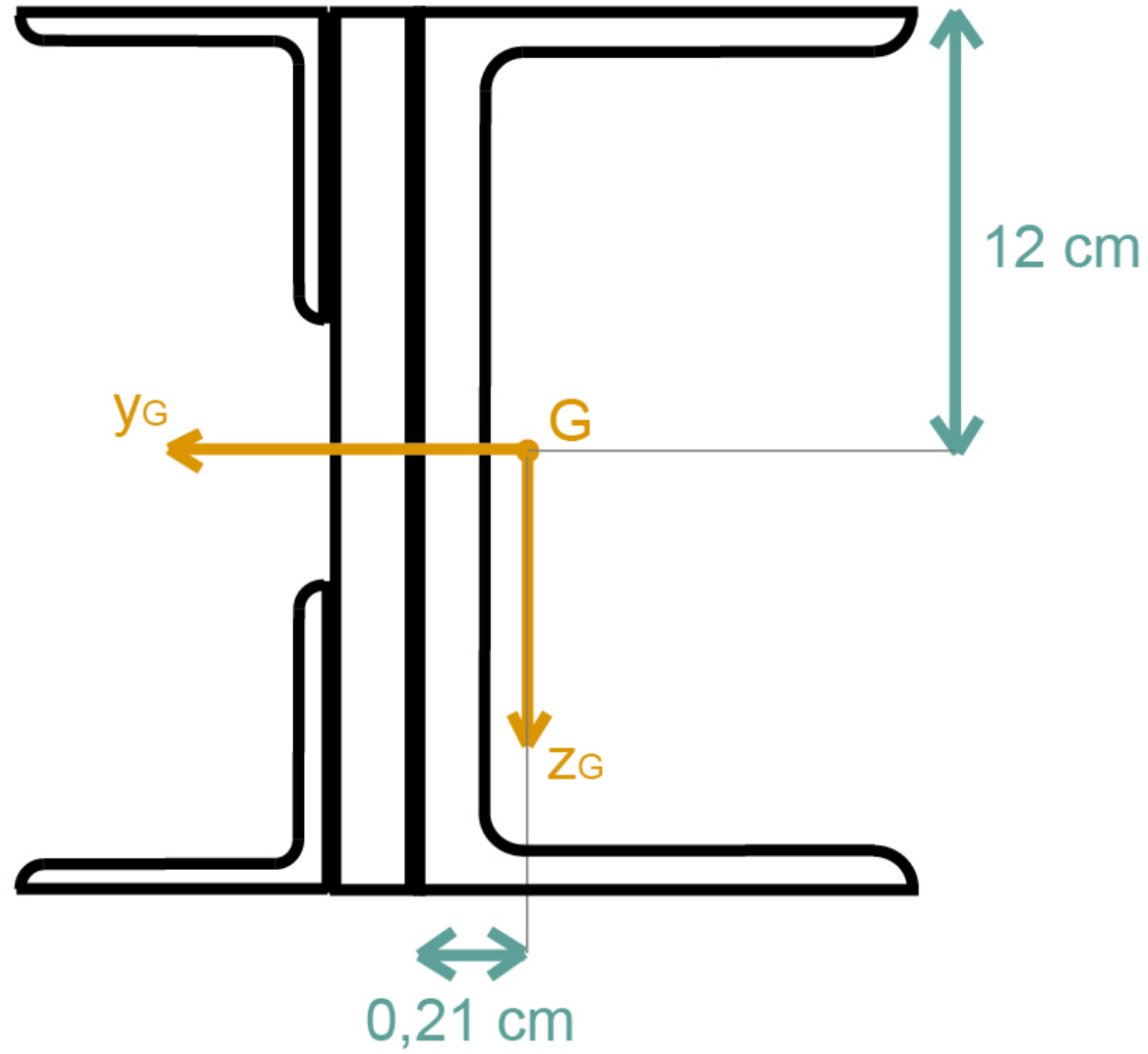


$$A_t \cdot y_G = \sum A_i \cdot y_{G_i}$$

$$y_G = \frac{2 \cdot 13,64 \text{ cm}^2 \cdot (2,22 \text{ cm} + 0,5 \text{ cm}) + 12 \text{ cm}^2 \cdot \frac{0,5 \text{ cm}}{2} + 42,3 \text{ cm}^2 \cdot (-2,23 \text{ cm})}{2 \cdot 13,64 \text{ cm}^2 + 12 \text{ cm}^2 + 42,3 \text{ cm}^2}$$

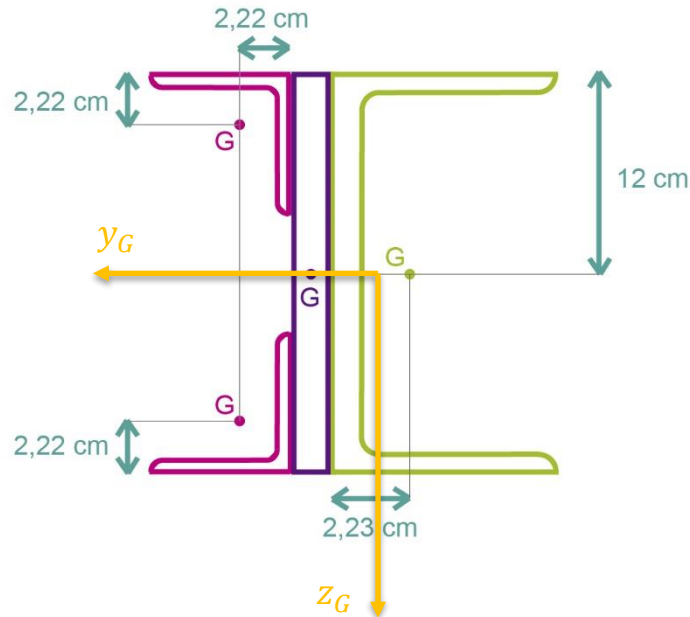
$$y_G = -0,2066 \text{ cm} \cong -0,21 \text{ cm}$$

$$G = (-0,21 \text{ cm} ; 12 \text{ cm})$$





Calculamos el momento de inercia respecto de los ejes baricéntricos de la figura total:



$$I_{y_G} = [71,15cm^4 + 13,64cm^2 \cdot (2,22cm - 12cm)^2] \cdot 2 + \frac{0,5cm \cdot (24cm)^3}{12} + 3600cm^4$$

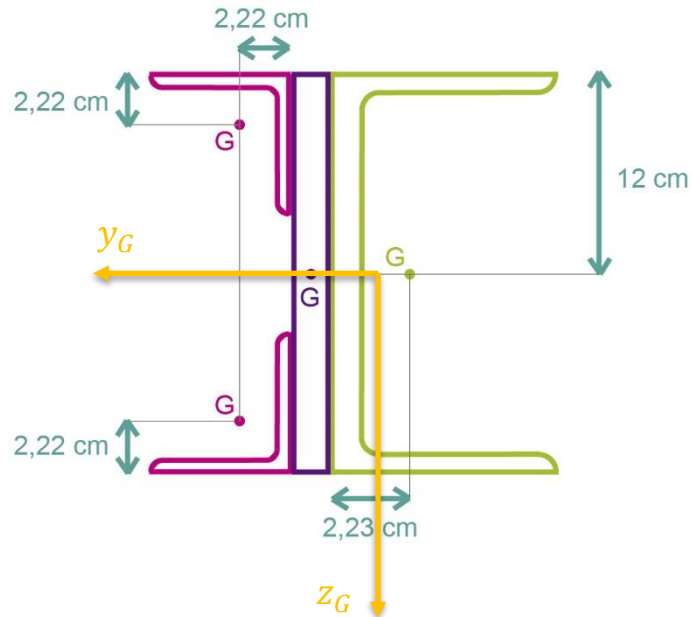
$$I_{y_G} = 6927,59cm^4 \cong 6928 cm^4$$

$$I_{z_G} = [71,15cm^4 + 13,64cm^2 \cdot (2,22cm + 0,5cm + 0,21cm)^2] \cdot 2 + 0,25cm^4 + 12cm^2 \cdot \left(\frac{0,5cm}{2} + 0,21cm\right)^2 + 248cm^4 + 42,3cm^2 \cdot (2,23cm - 0,21cm)^2$$

$$I_{z_G} = 799,89cm^4 \cong 800cm^4$$



Calculamos el momento estático de cada perfil respecto a y_G



$$S_{y_G}^{Ai} = 13,64 \text{ cm}^2 \cdot (12 \text{ cm} - 2,22 \text{ cm})$$

$$S_{y_G}^{As} = 13,64 \text{ cm}^2 \cdot (-12 \text{ cm} + 2,22 \text{ cm})$$

$$S_{y_G}^R = 12 \text{ cm}^2 \cdot (0 \text{ cm})$$

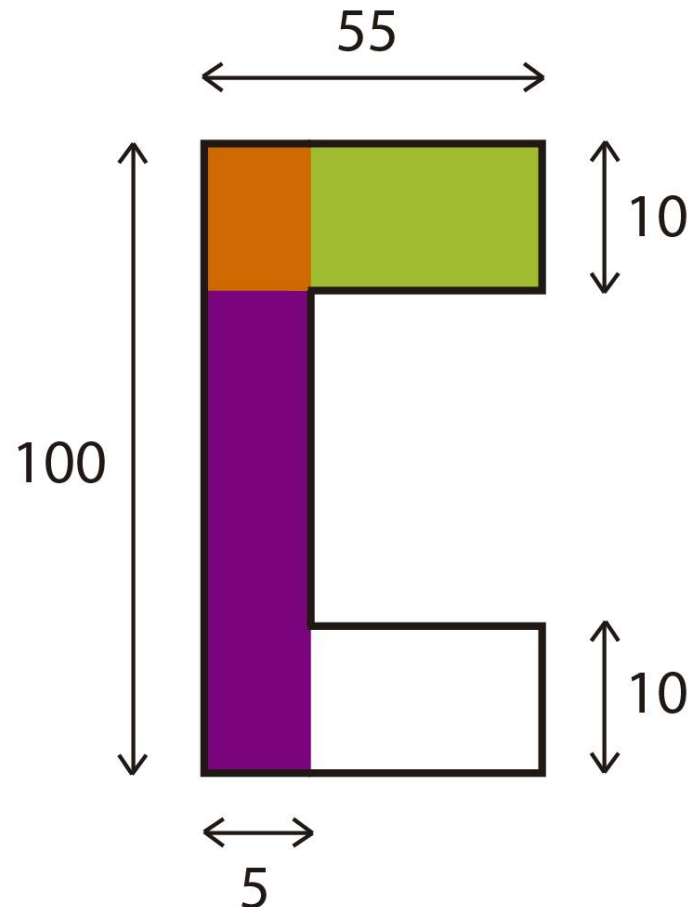
$$S_{y_G}^{UPN} = 42,3 \text{ cm}^2 \cdot (0 \text{ cm})$$

$$S_{y_G}^{Tot} = 0$$



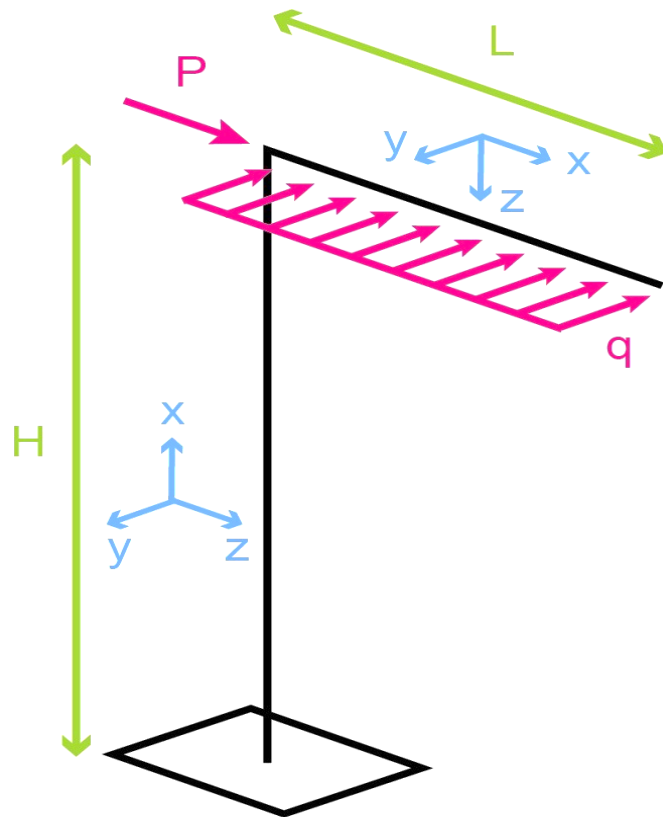
Geometría de las superficies:

- 1) Calcular los momentos de inercia principales del perfil.
- 2) Calcular el momento estático de:
A) Rectángulo verde.
B) Rectángulos verde + naranja.
C) Rectángulos verde + naranja + violeta.





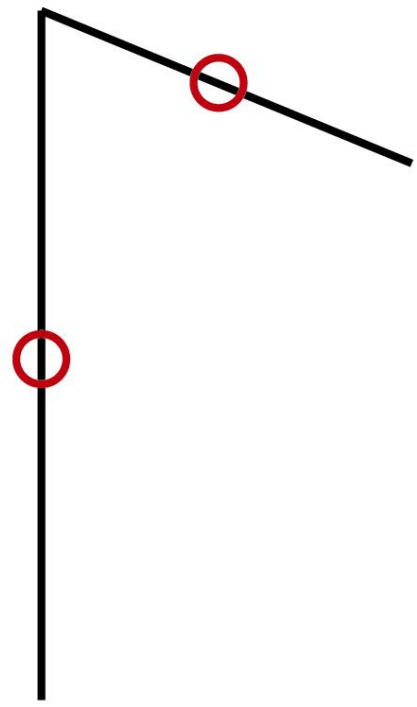
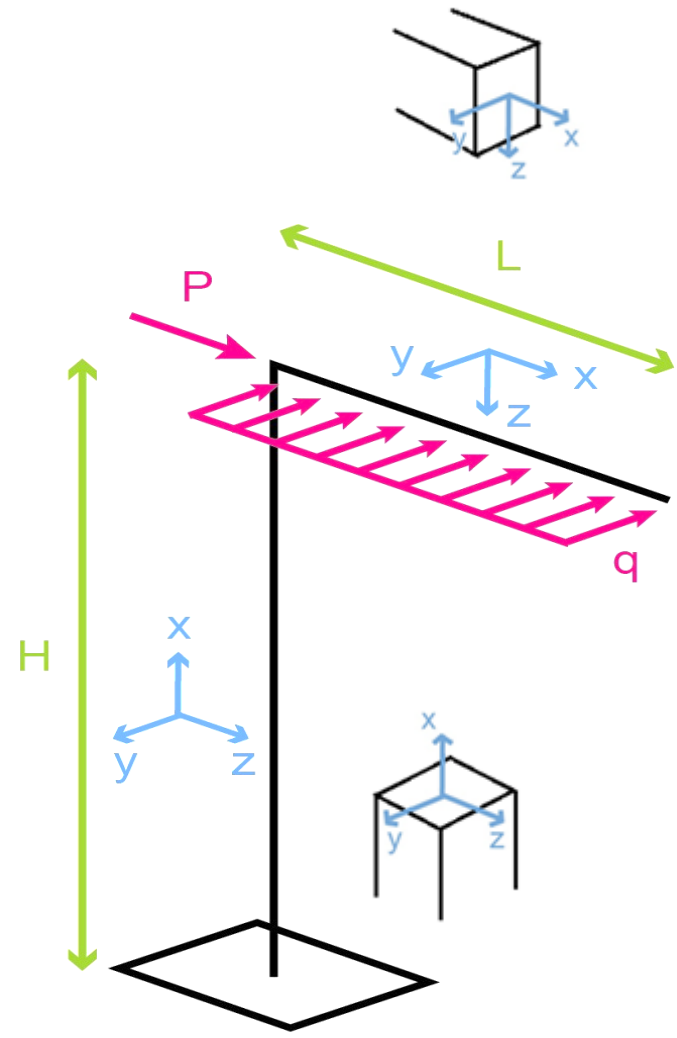
Diagramas de características



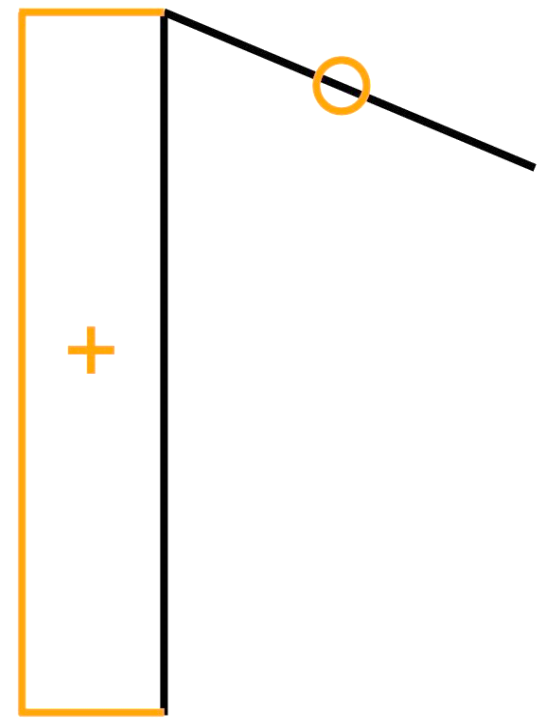
Ejercicio 2: Trazar los diagramas de características

¡Observación!

No calcular reacciones de vínculo a menos que sea necesario o que lo pida el ejercicio. Esto nos ayuda a evitar errores.

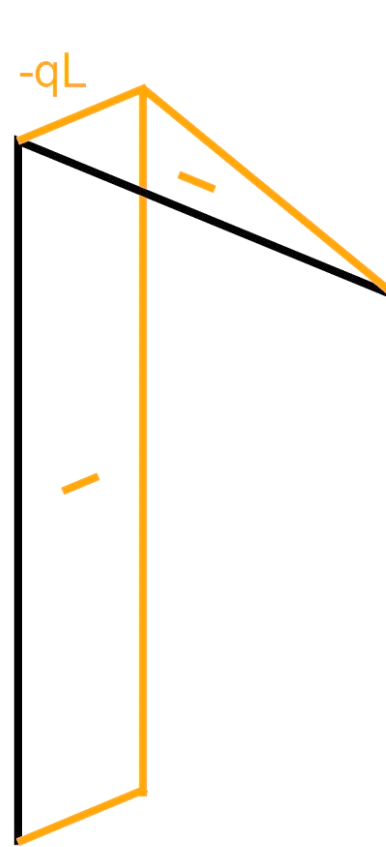
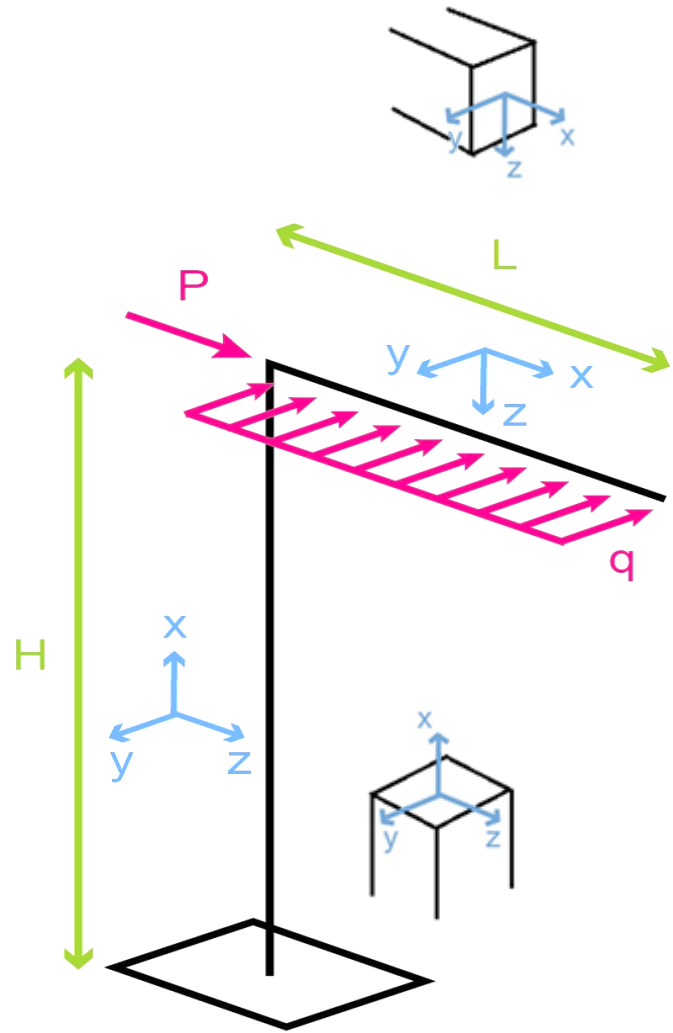


N [kN]
(cualquier plano)

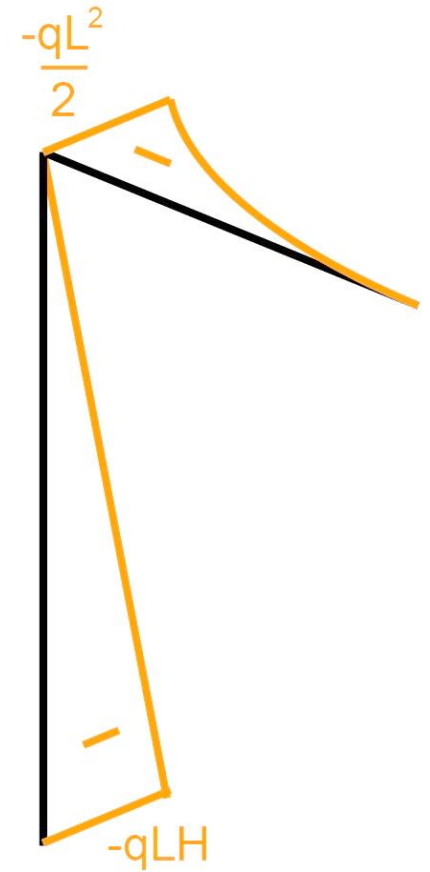


$$\frac{qL^2}{2}$$

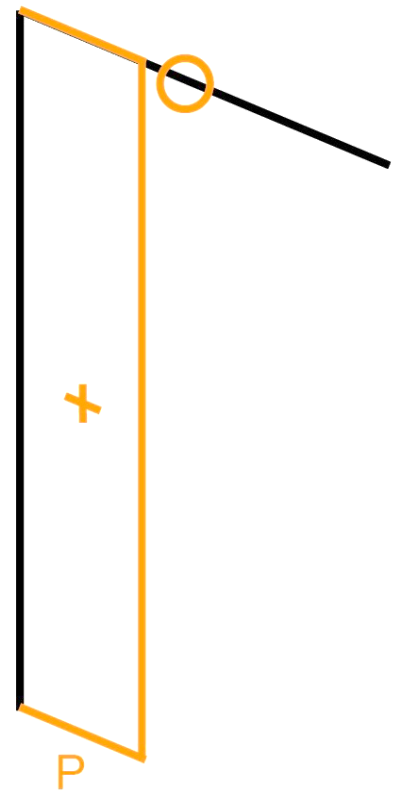
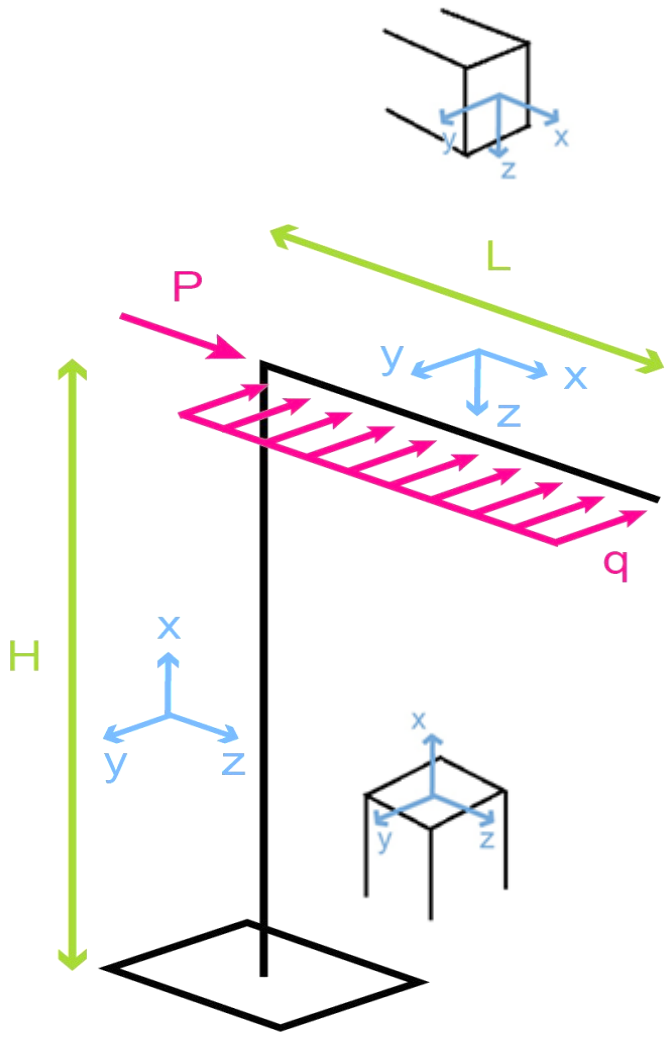
Mx [kN m]
(cualquier plano)



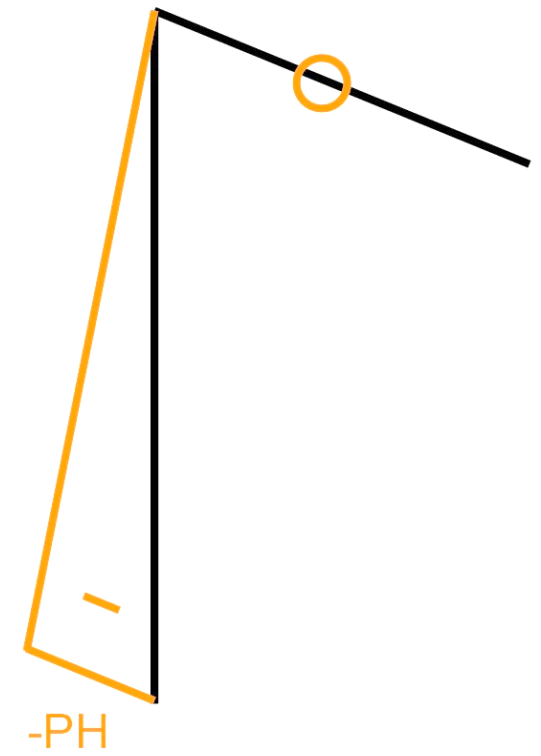
Q_y [kN]
(plano xy)



M_z [kN m]
(plano xy)



Q_z [kN]
(plano xz)



M_y [kN m]
(plano xz)



Hipo/Iso/Hiper-estaticidad



Hipostático



Isostático



Hiperestático



Ejercicios adicionales

Diagramas de características:

