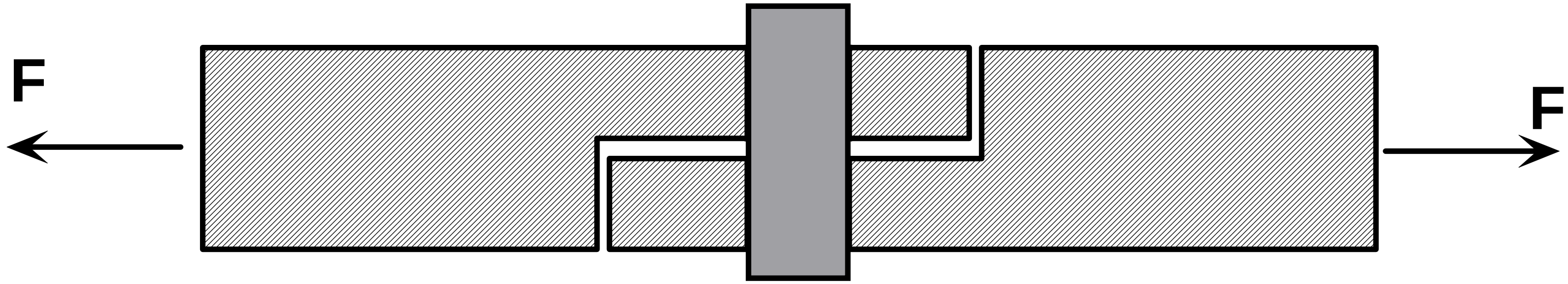
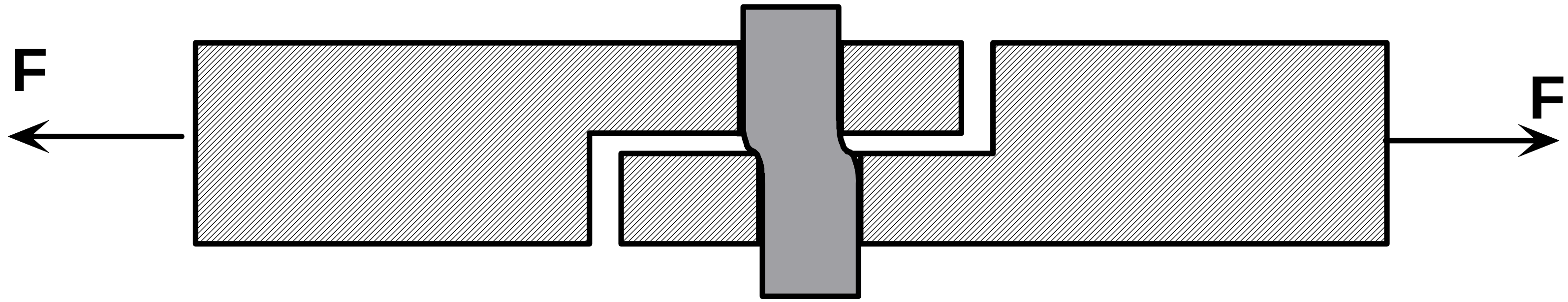
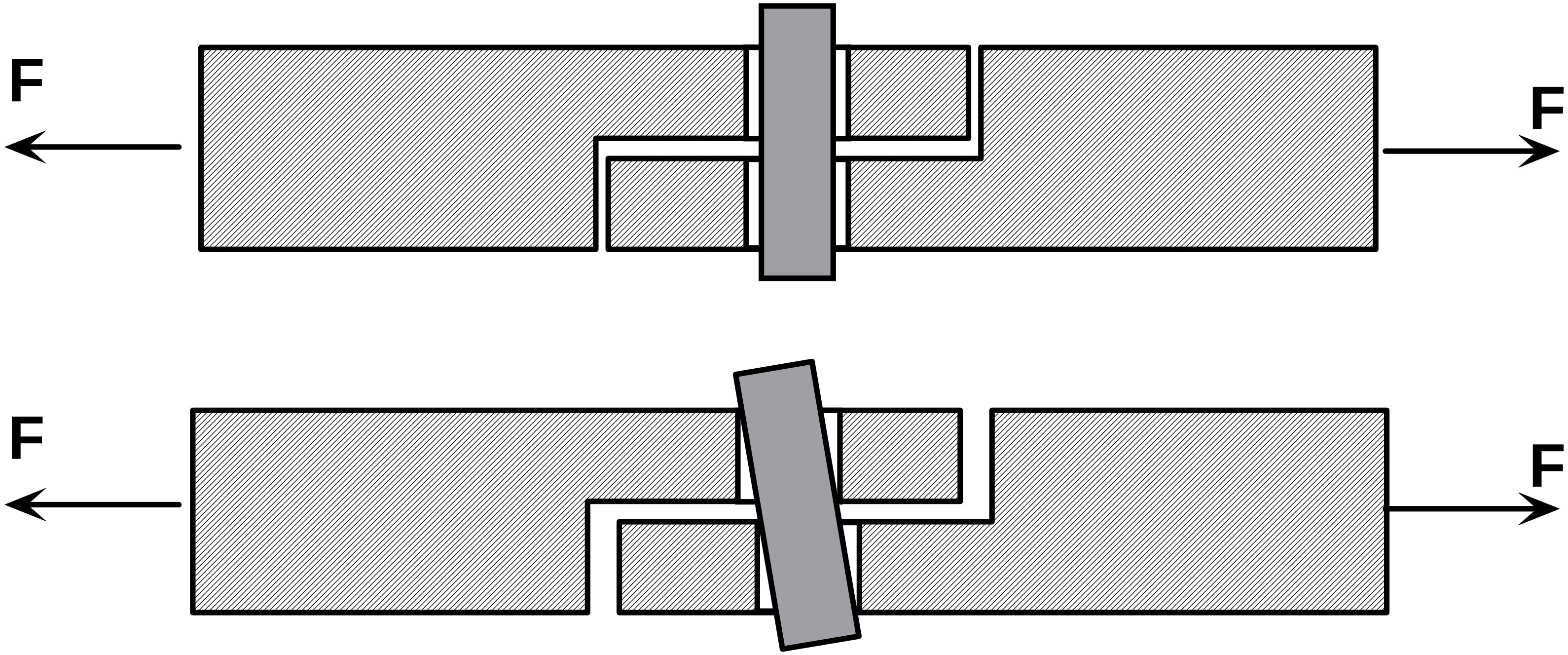
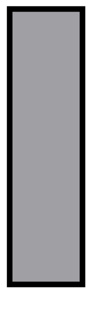
Unión con pasador/tornillo

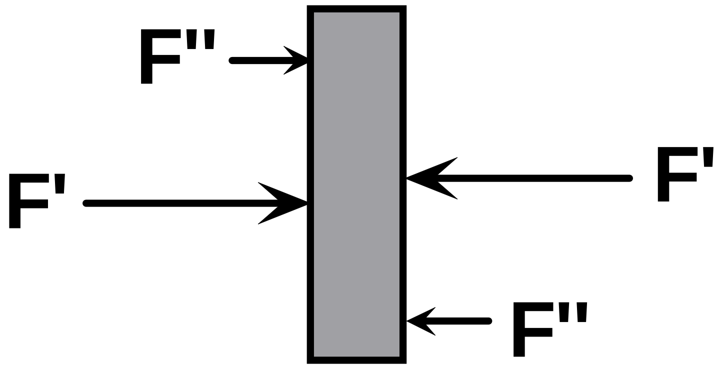






Acciones

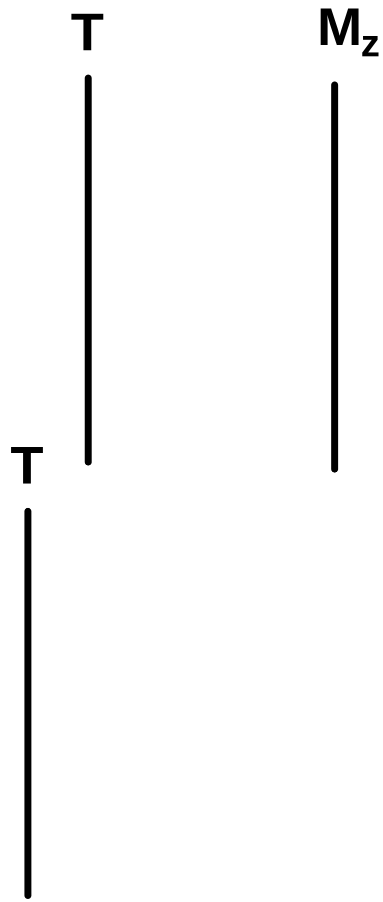




$$\sum M_{centro} = 0 \quad \rightarrow$$

$$F'' = F' \frac{s}{h}$$

Esfuerzos

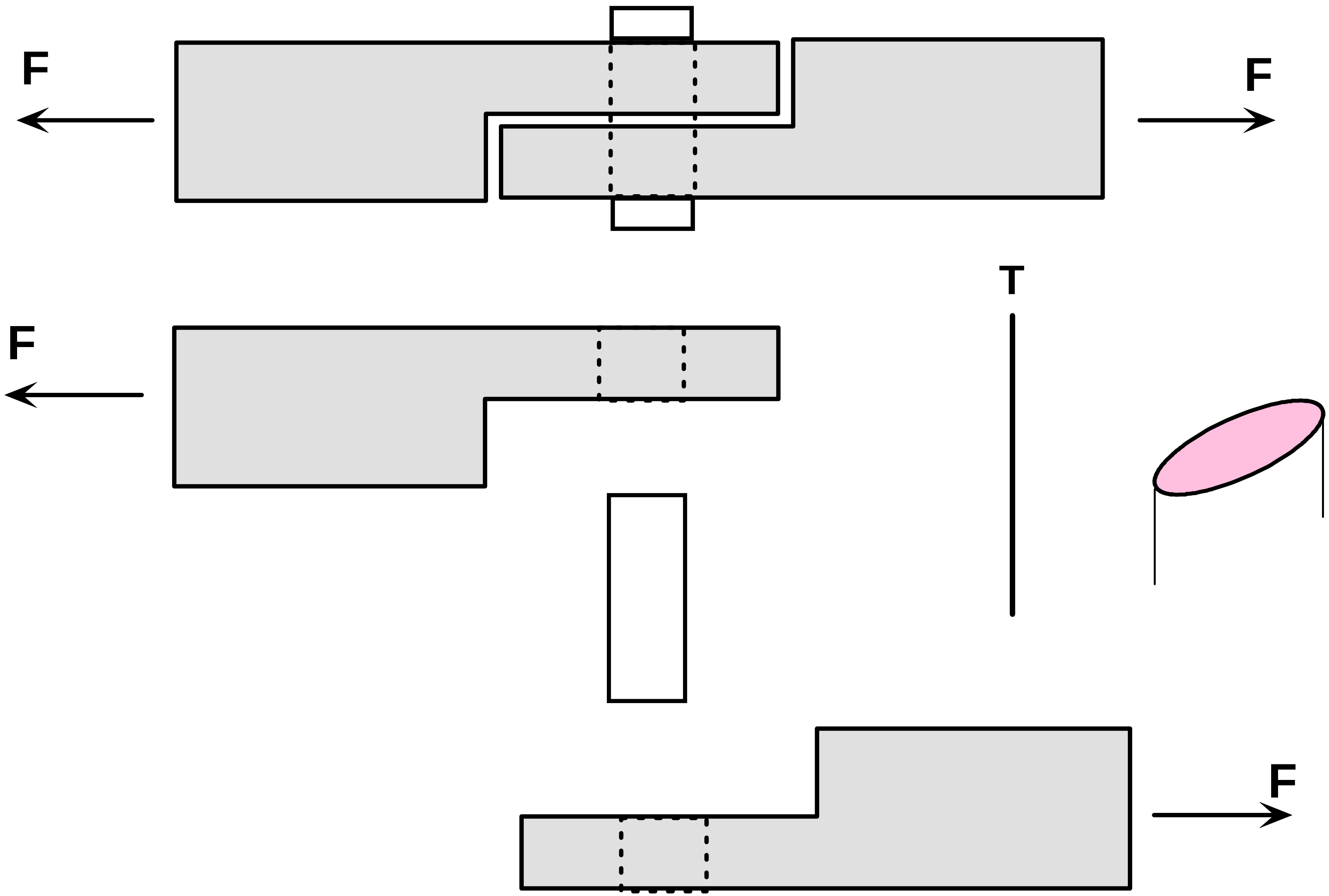


Sustituyendo:

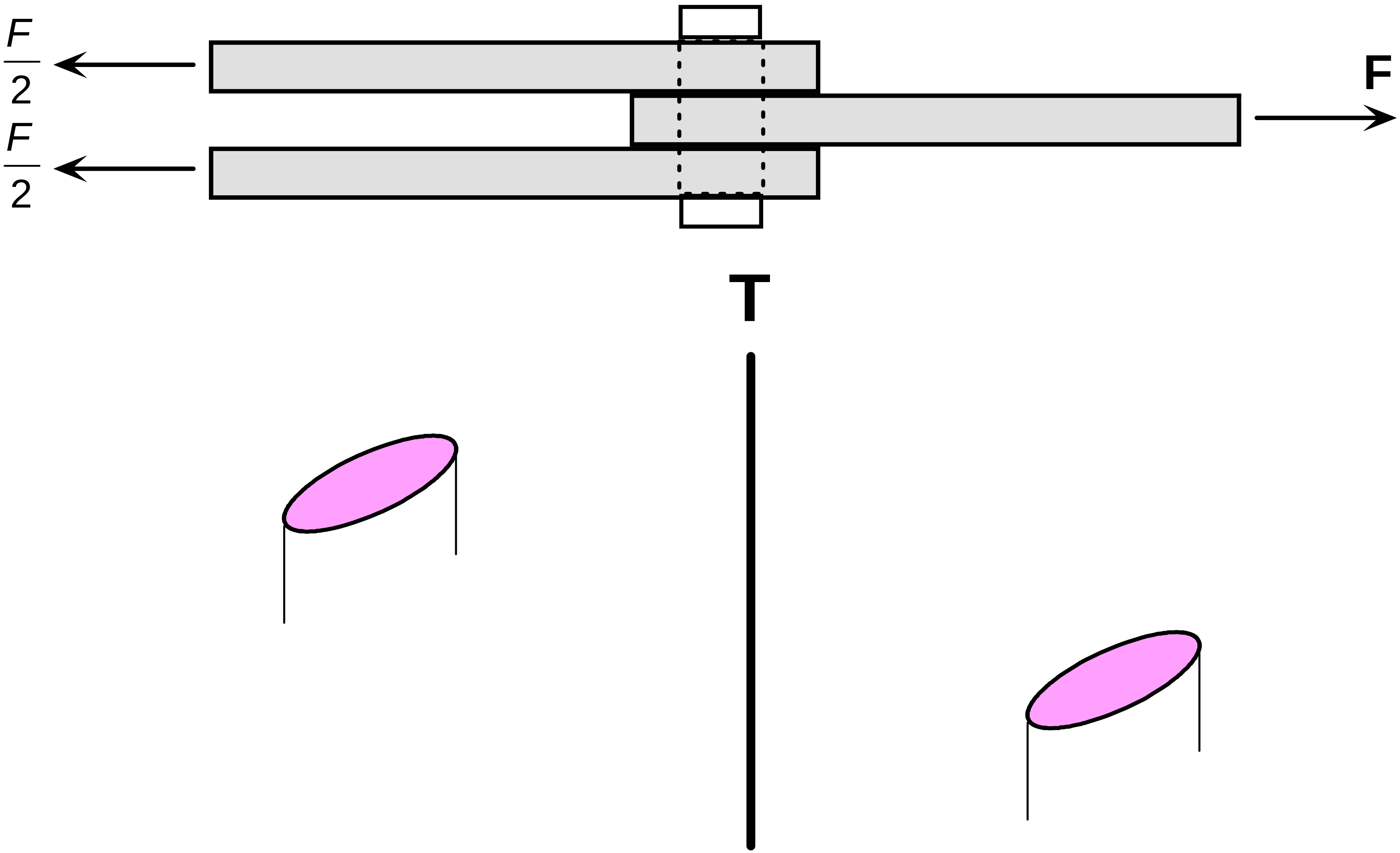
$$F'' = F \frac{s}{h+s} \qquad F' = F \frac{h}{h+s}$$

Si s << h:

Esquema de fuerzas (simple cortadura)

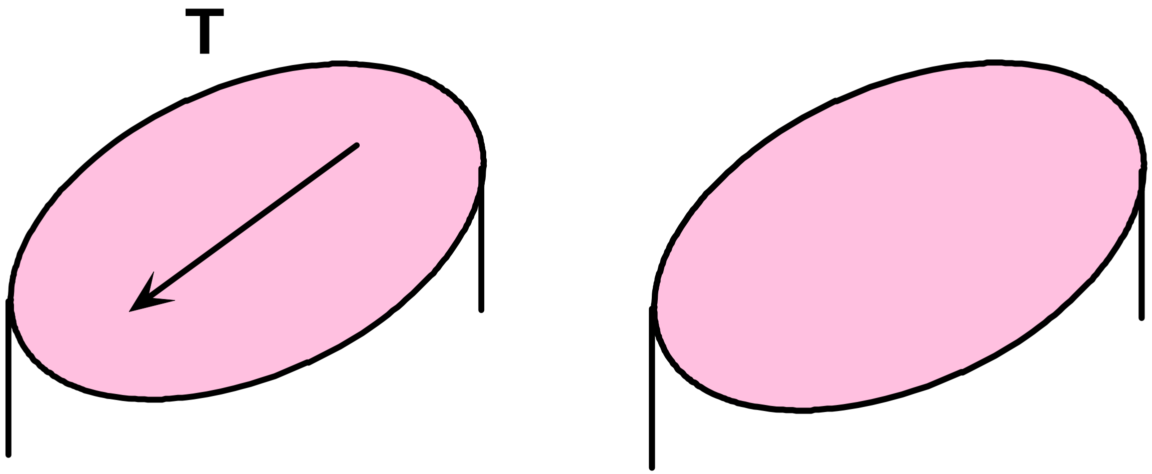


Doble cortadura



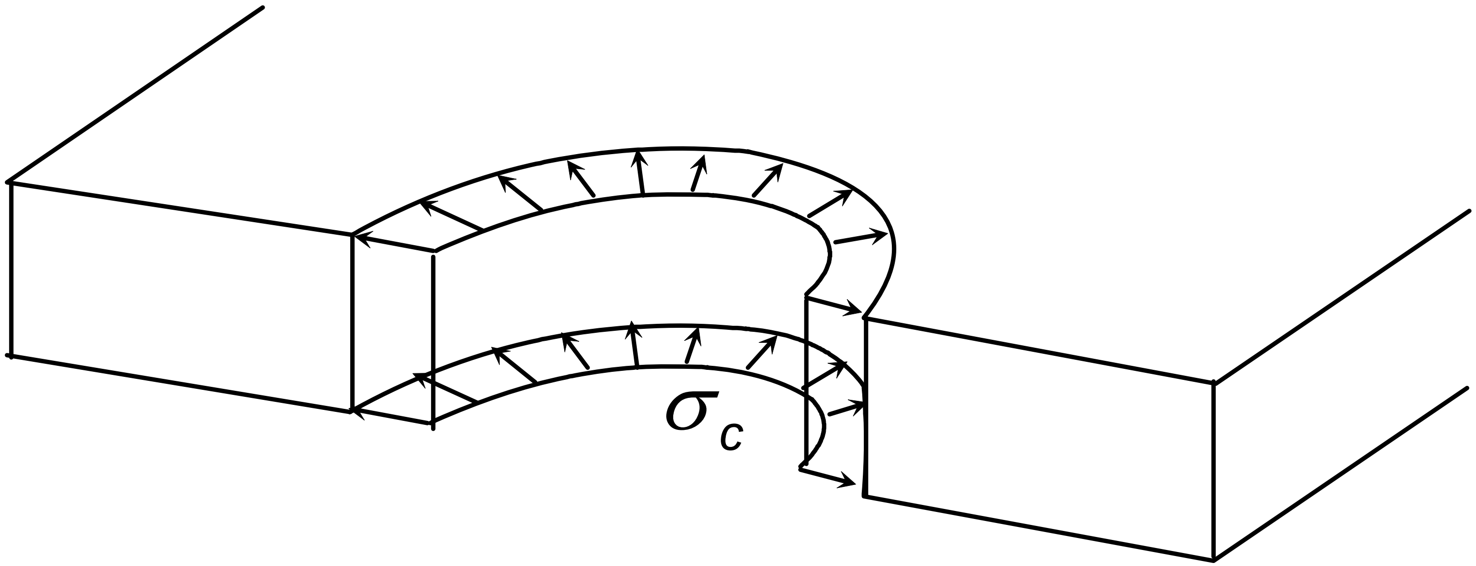
Comprobación plástica de uniones (DÚCTILES)

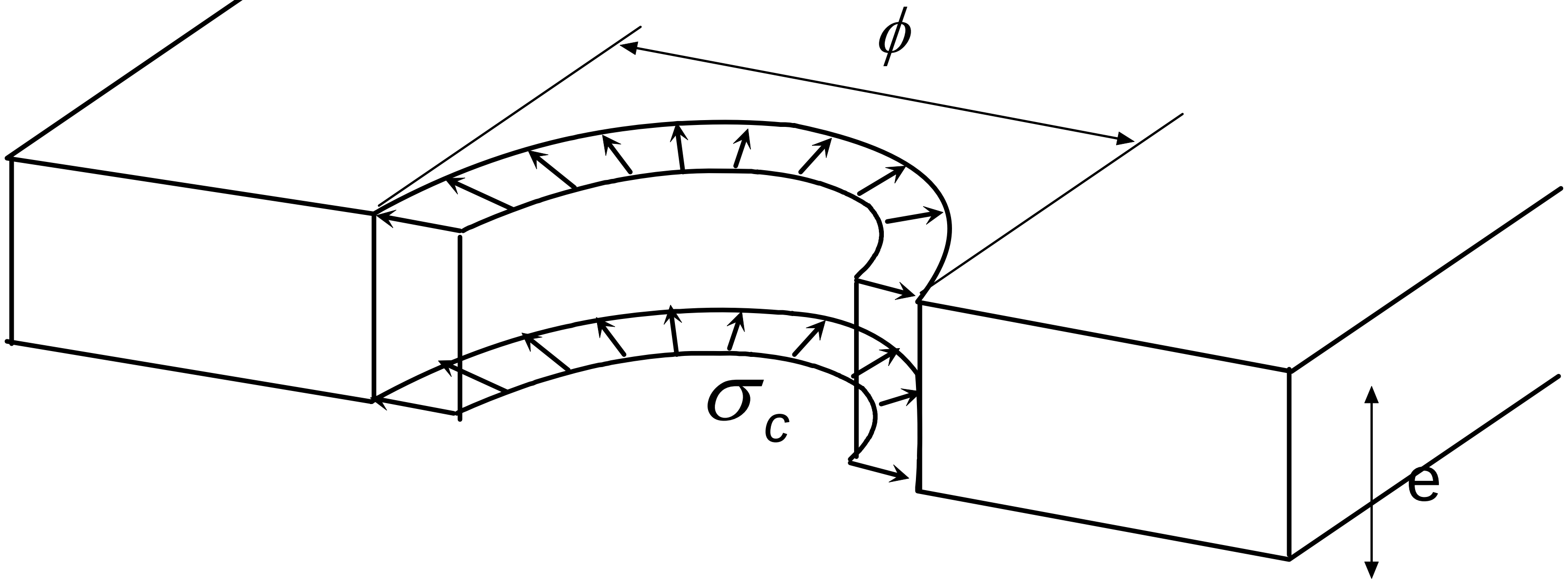
1.- Cortadura del elemento

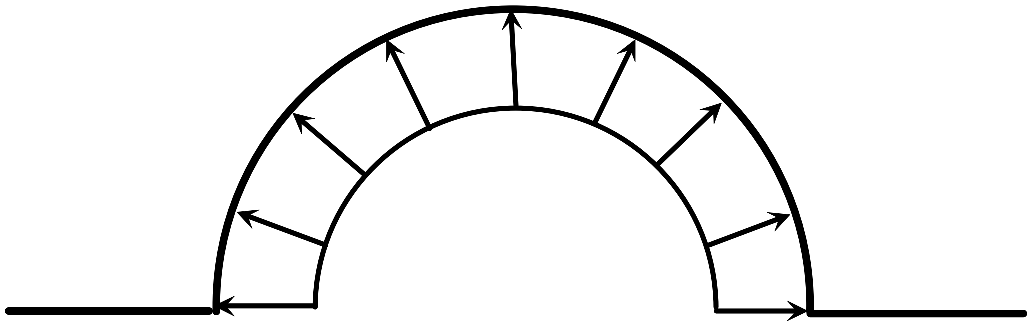


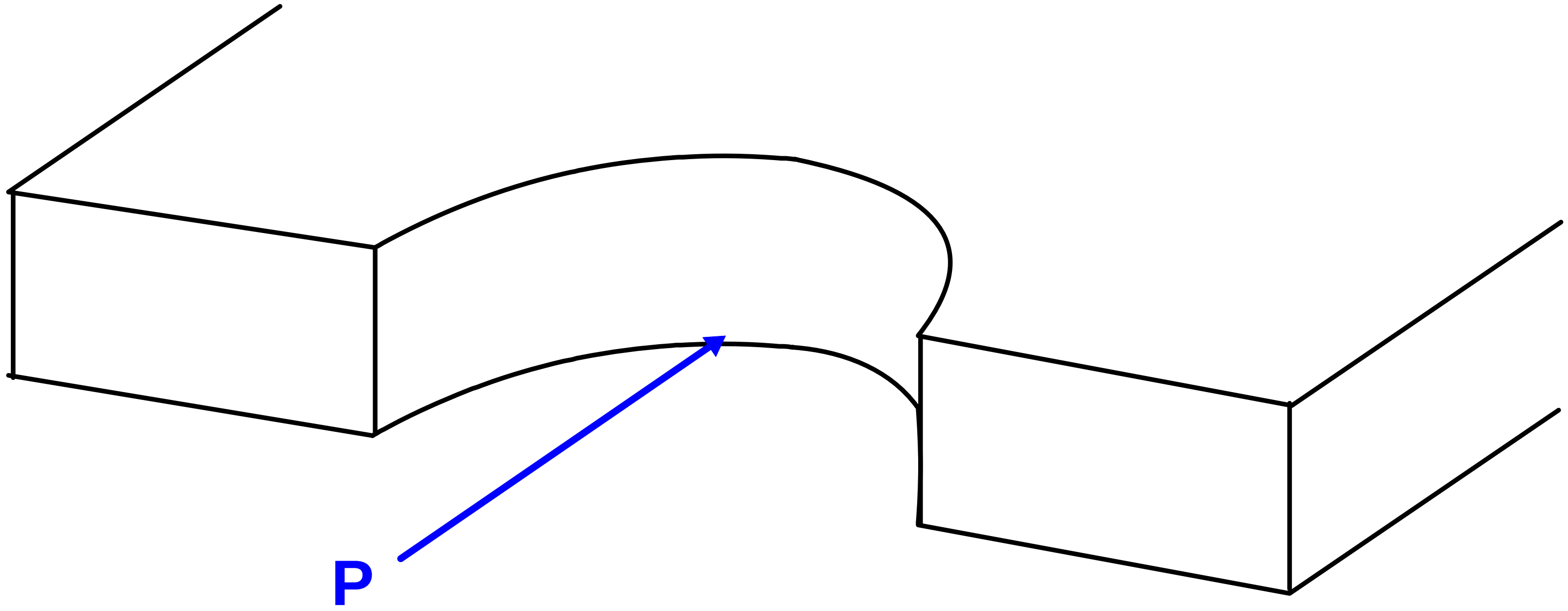
2.- Aplastamiento

- Semitaladro en régimen plástico (σ_c uniforme)



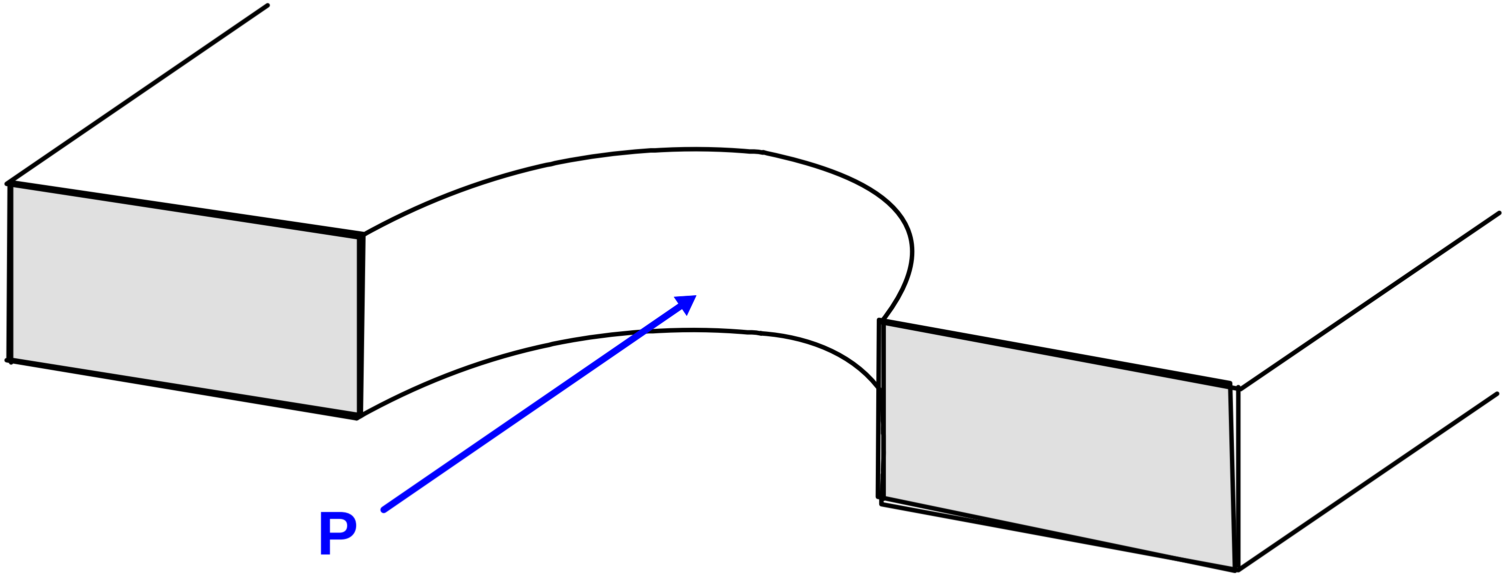

ϕ
σ_c
e



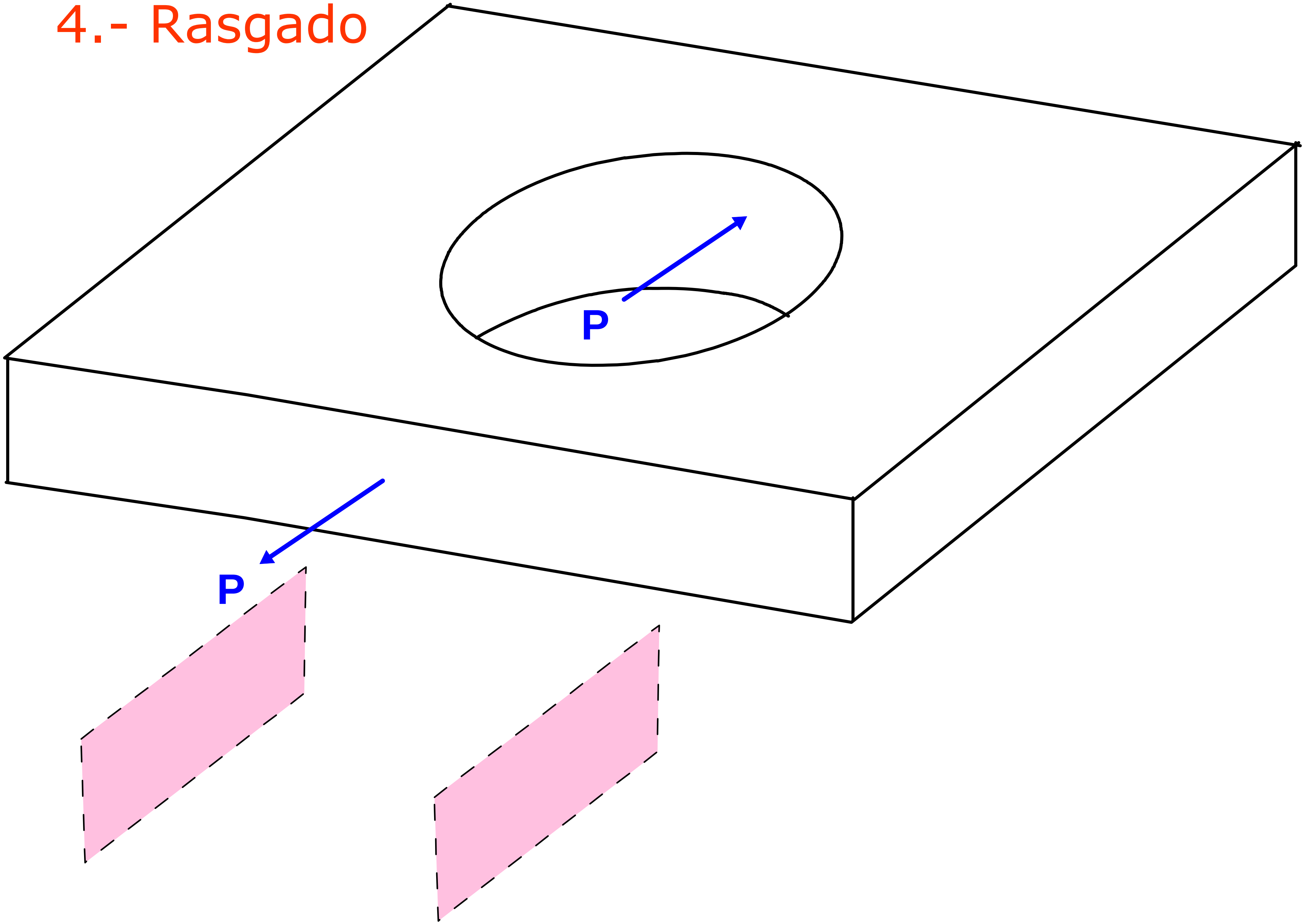

P

3.- Tracción

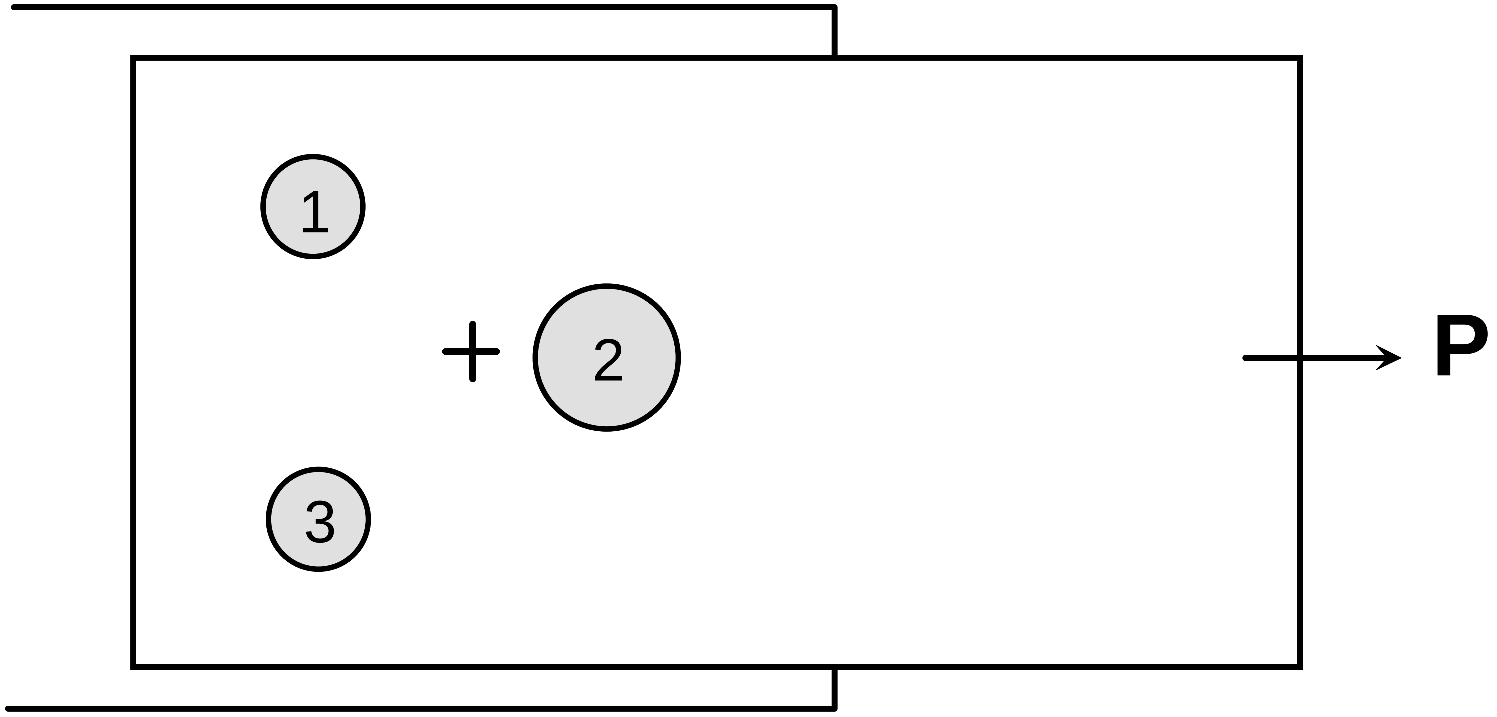
- Sección útil en régimen plástico (σ_t uniforme)



4.- Rasgado



UNIONES CON VARIOS ELEMENTOS: CARGA CENTRADA

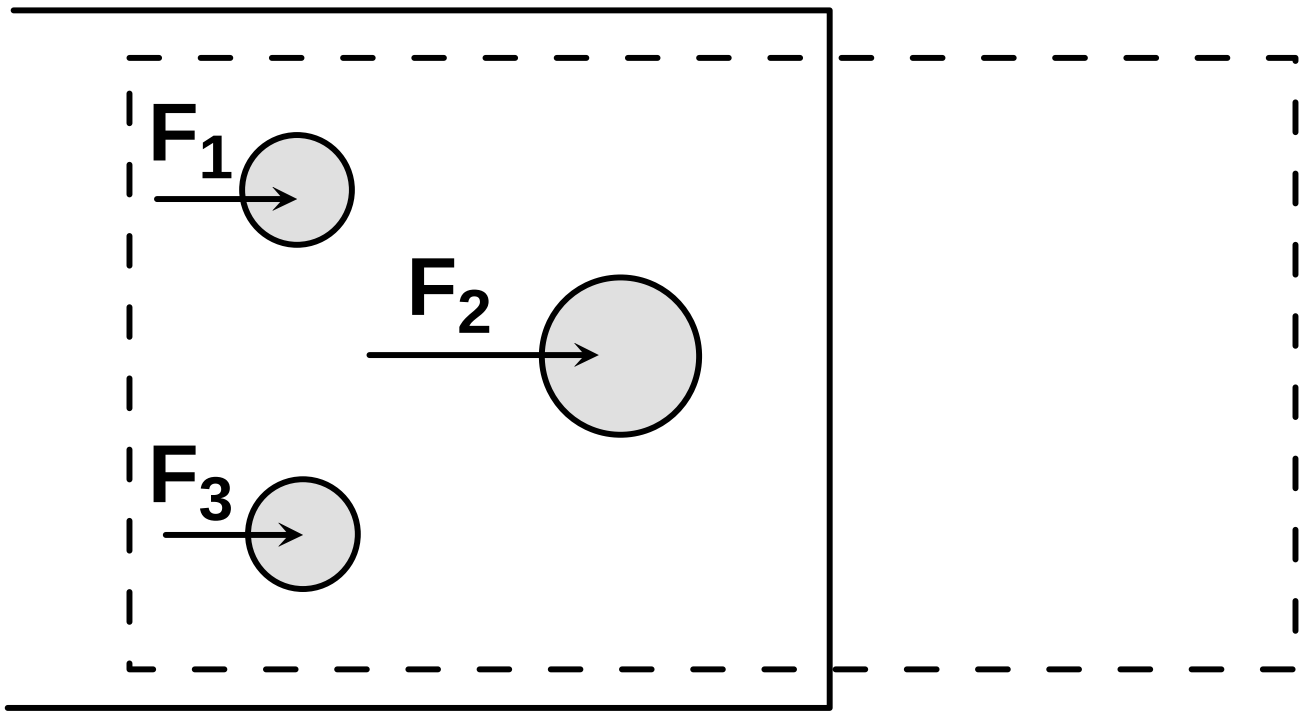


HIPÓTESIS

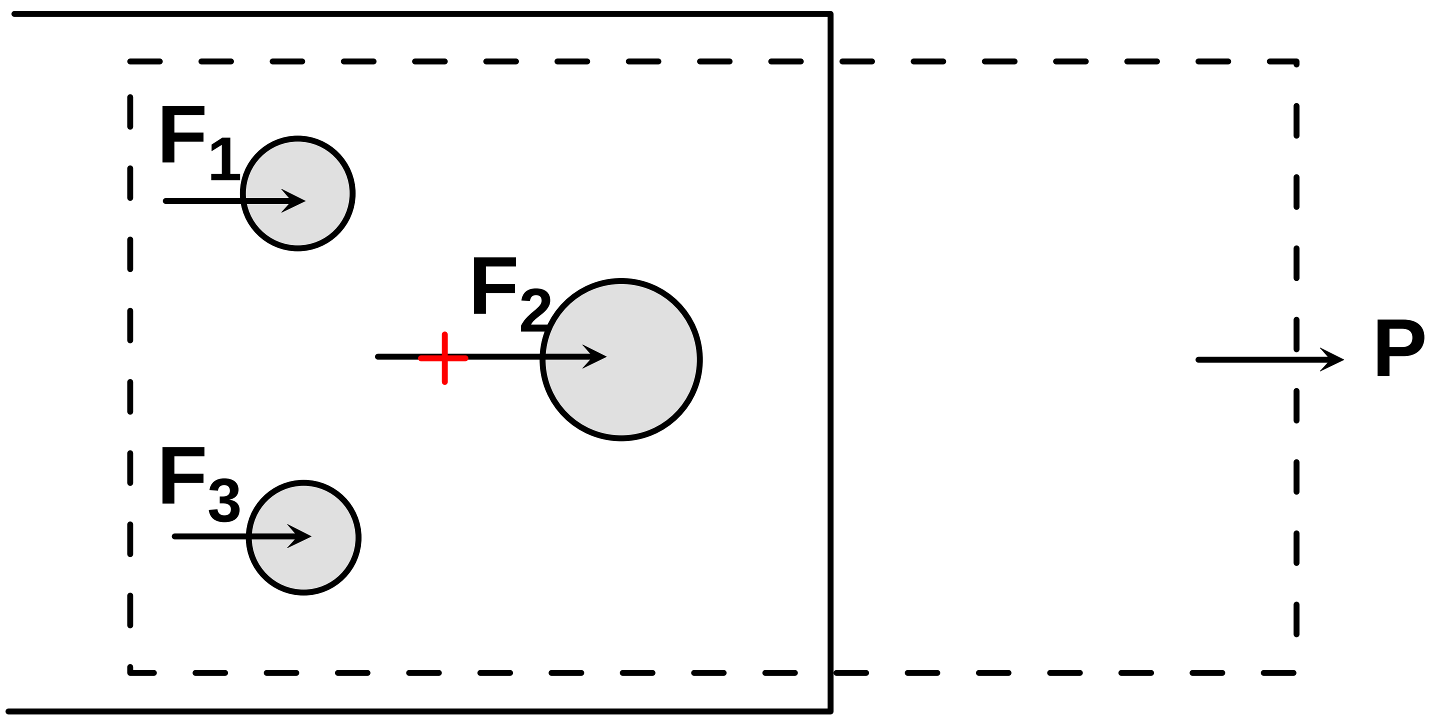
- A más , más

$$F_i = P \frac{A_i}{\sum A_i}$$

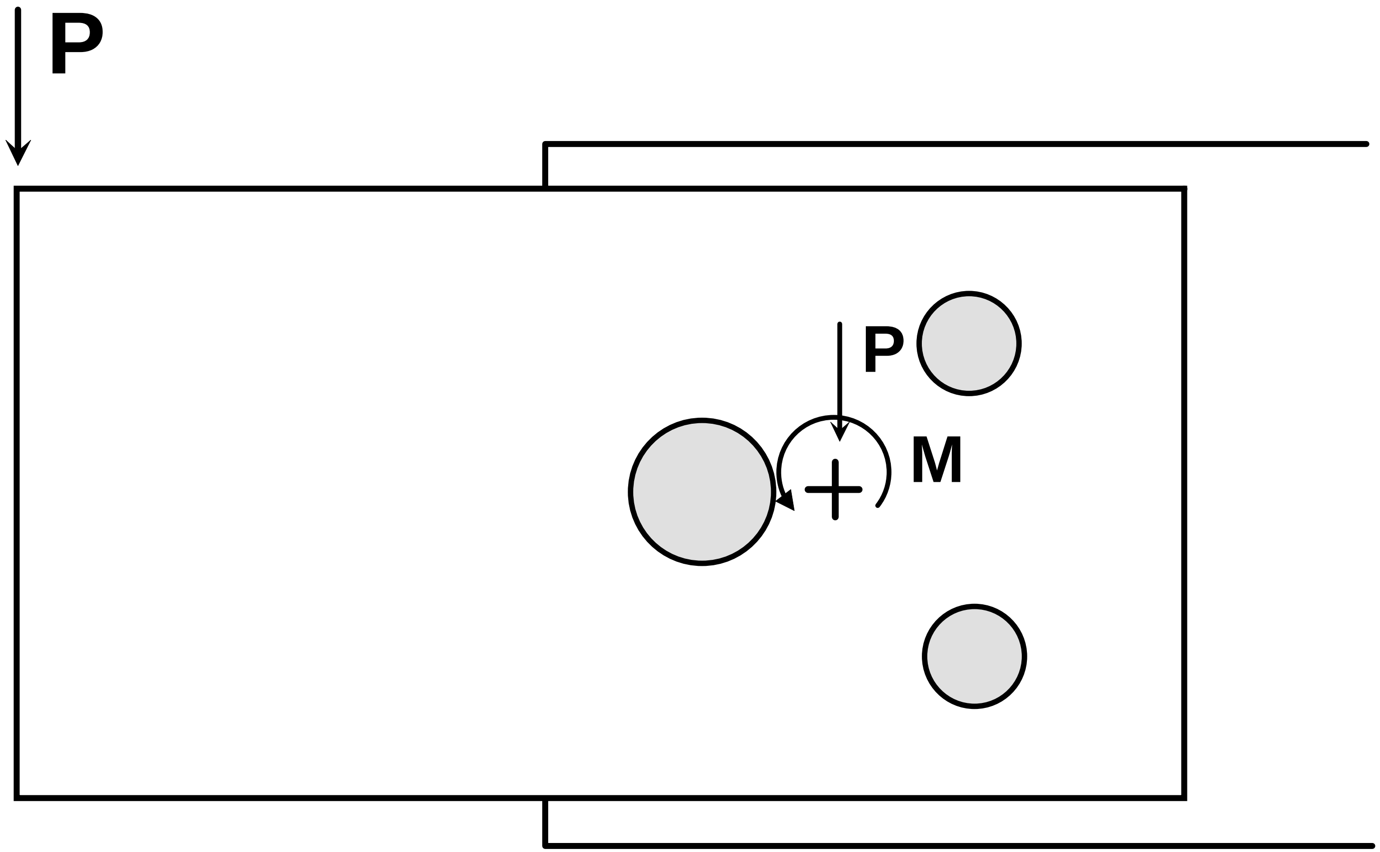
Caso particular: *n* elementos iguales



Equilibrio de momentos:

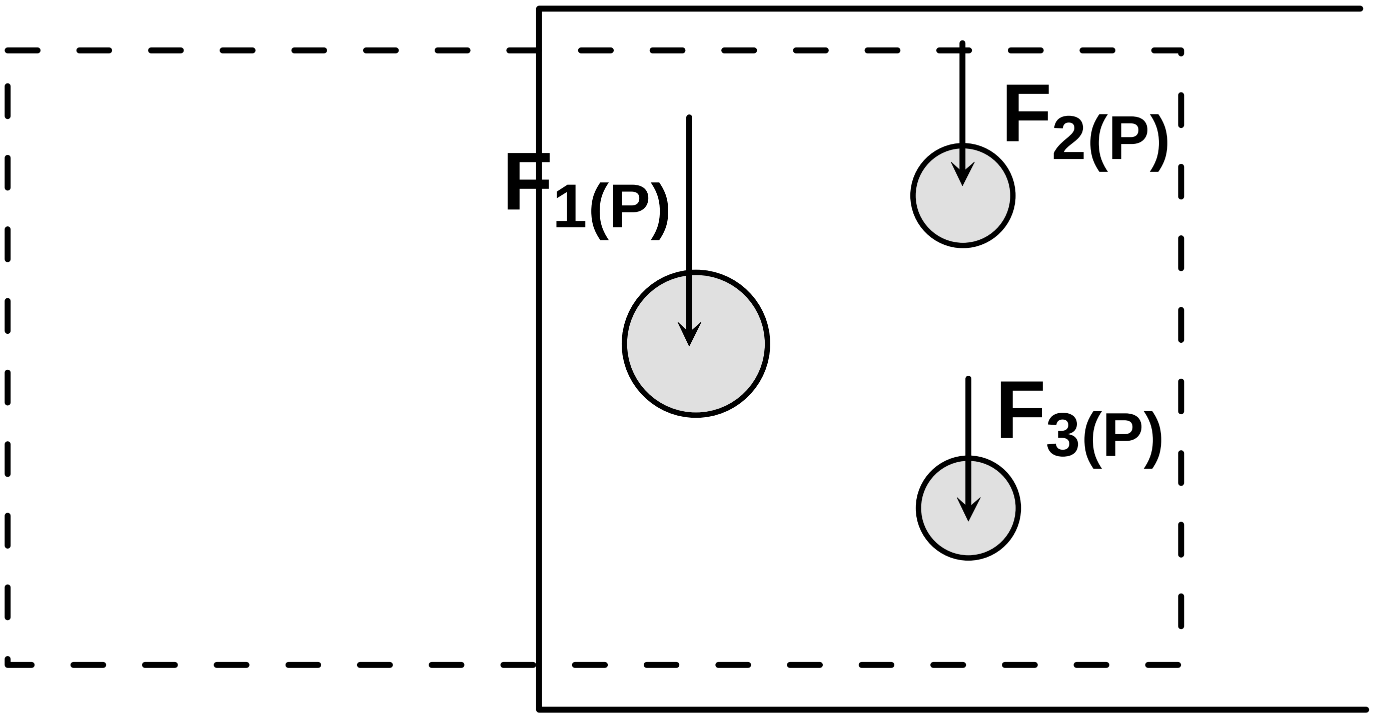


UNIONES CON VARIOS ELEMENTOS: CARGA EXCÉNTRICA

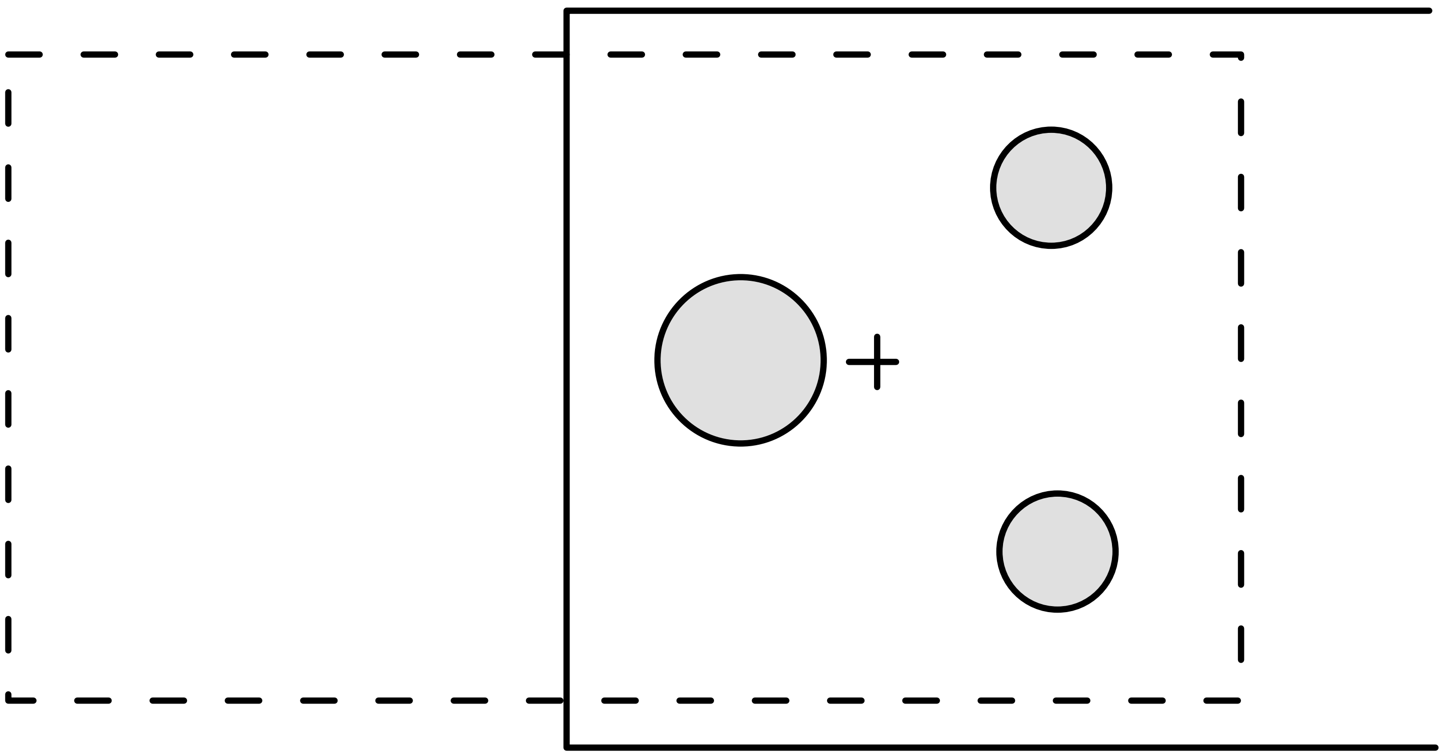


1.- Reparto de P ya estudiado

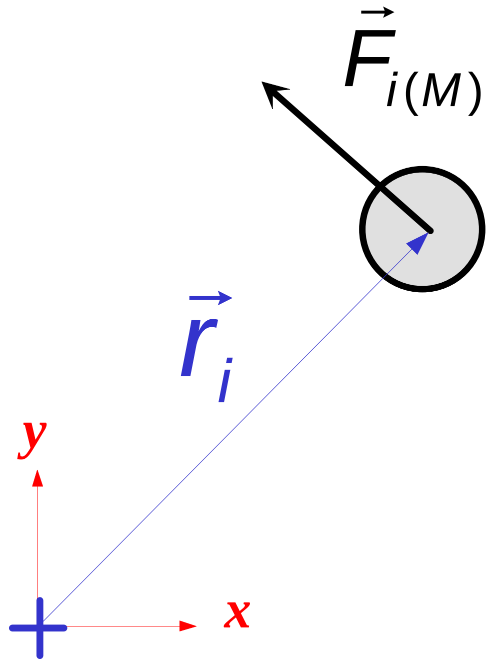
$$F_{i(P)} = P \frac{A_i}{\sum A_i} \qquad \vec{F}_{i(P)} = \vec{P} \frac{A_i}{\sum A_i}$$



2.- M HIPÓTESIS de reparto de proporcional a:



Posición del eje de giro



- Equilibrio de fuerzas: $\sum \vec{F}_{i(M)} = 0 \quad \rightarrow \quad \left\{ \right.$

Constante C

- Equilibrio de momentos:

Por tanto:

$$\vec{F}_{i(M)} = \frac{M}{\sum A_i r_i^{\,2}} A_i \left(\vec{k} \times \vec{r}_i \right)$$

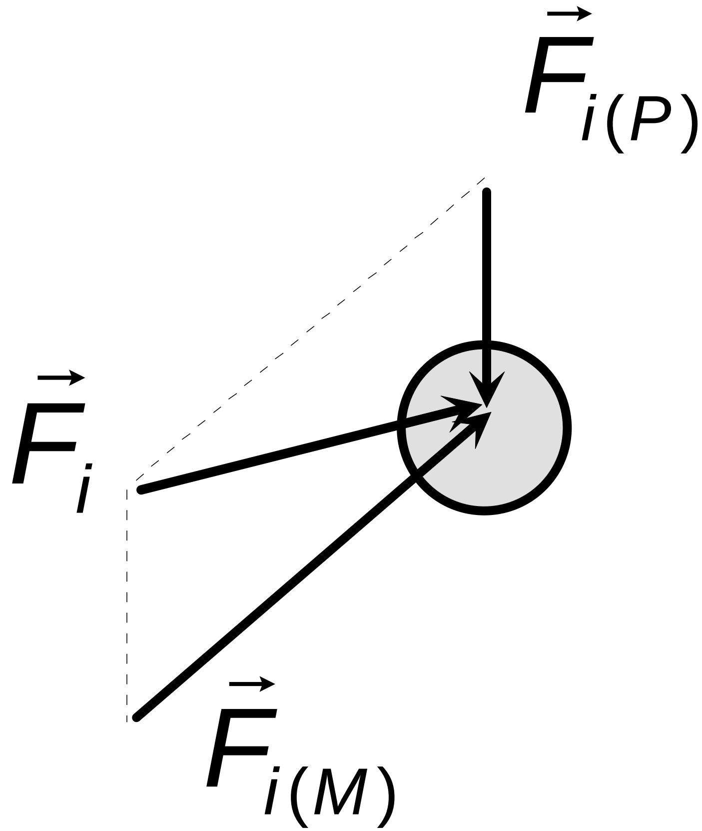
Casos particulares

- *n* elementos iguales:

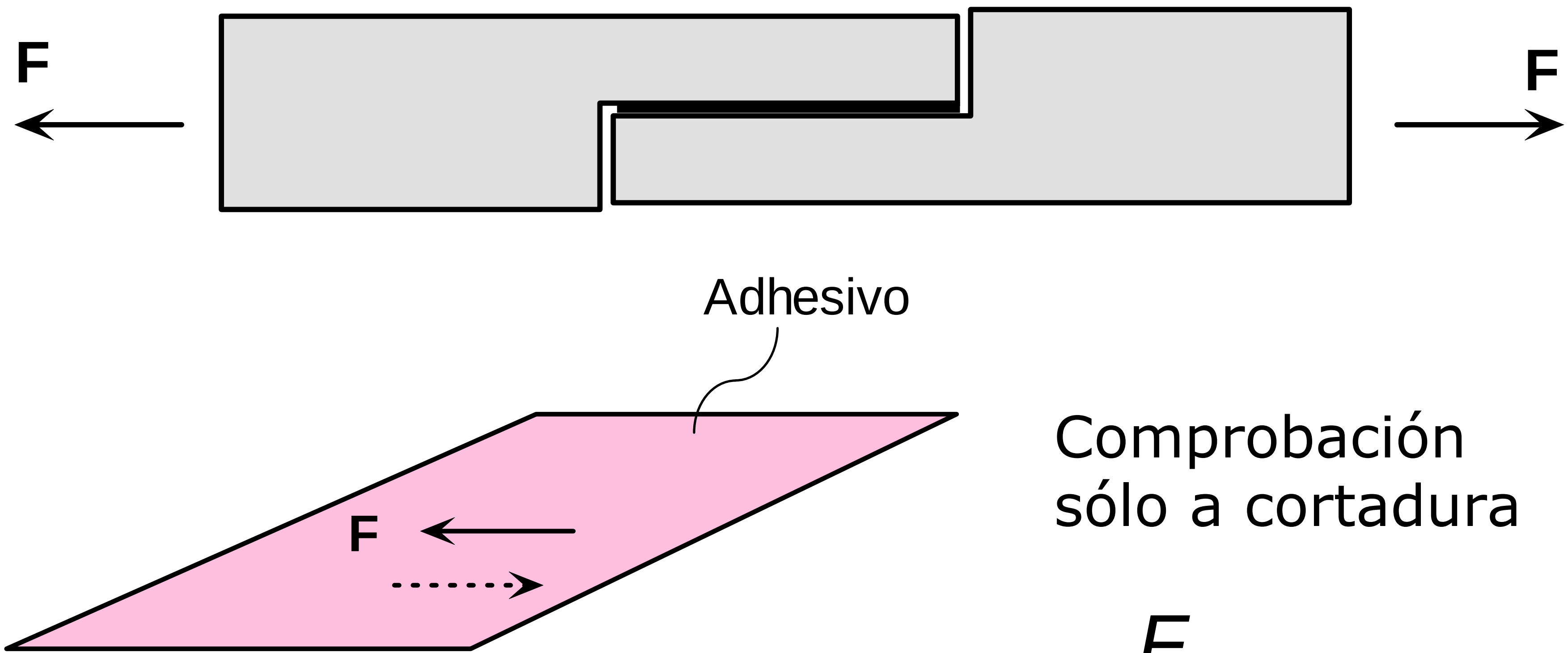
- *n* elementos iguales, y a la misma distancia *r* :

Resultante

$$\vec{F}_i = \vec{F}_{i(P)} + \vec{F}_{i(M)}$$



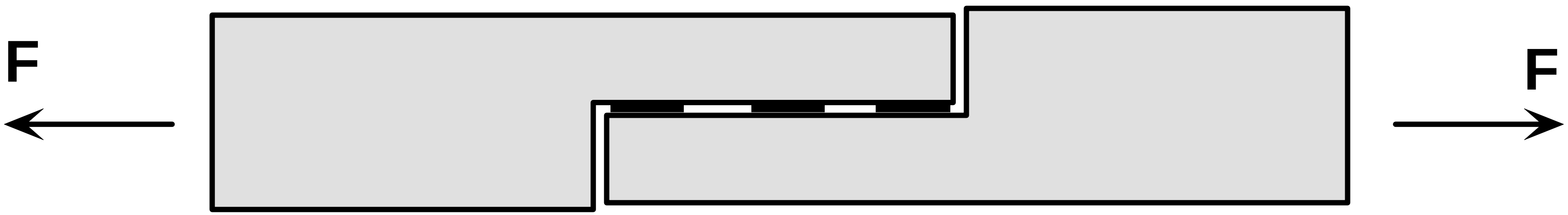
Uniones adhesivas continuas

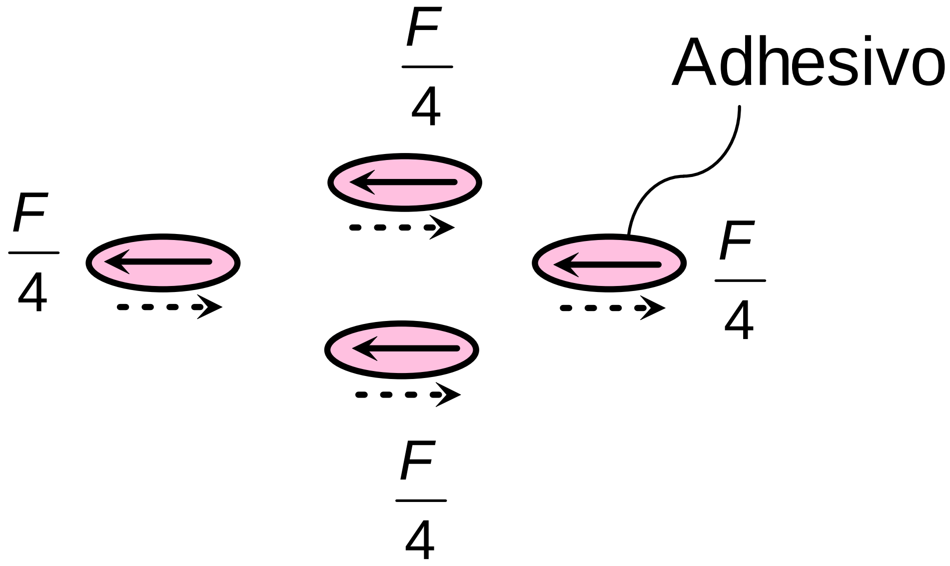


Comprobación
sólo a cortadura

$$\frac{F}{A} < \tau_{adm}$$

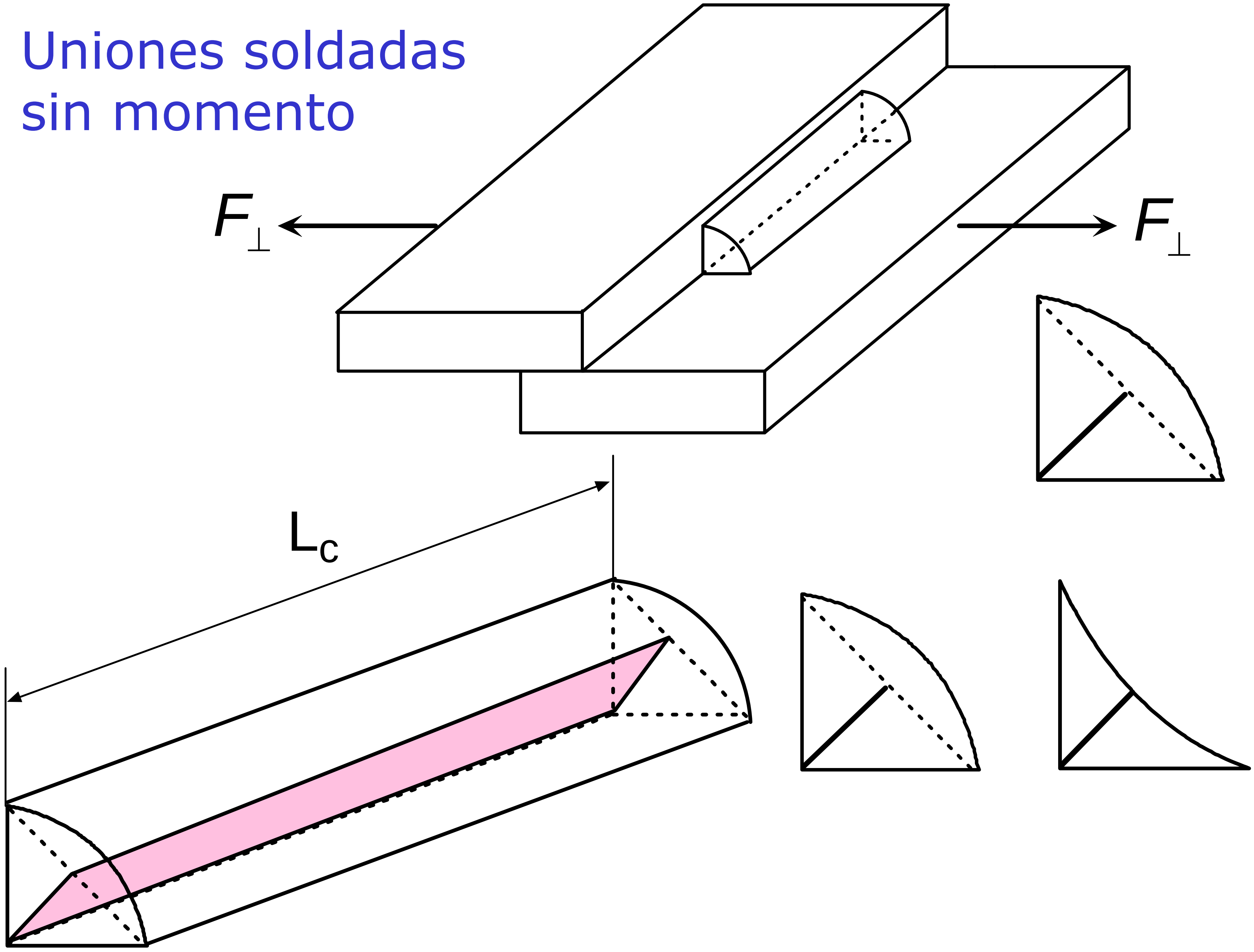
Uniones adhesivas discontinuas

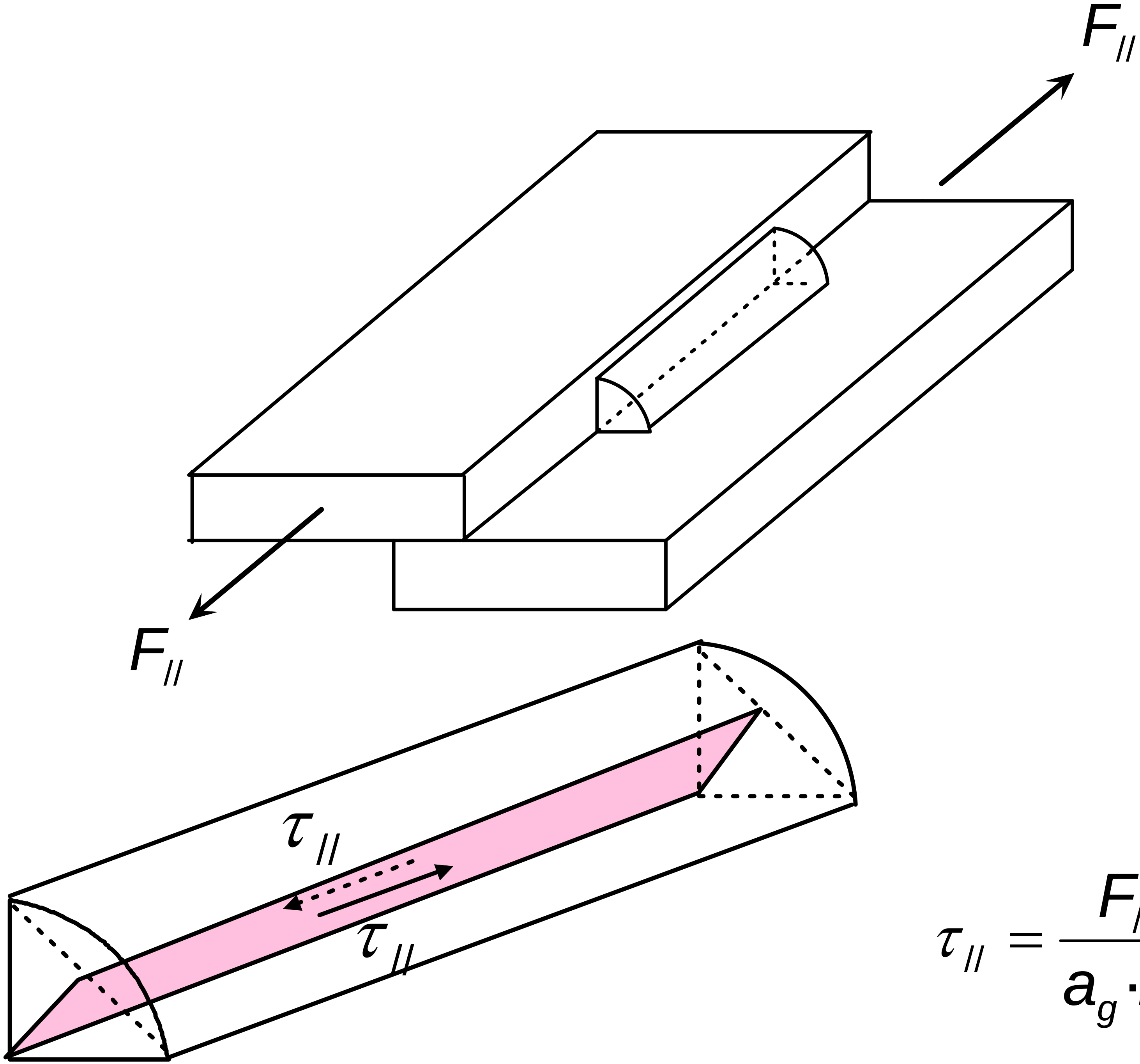




- Comprobación sólo a cortadura

Uniones soldadas sin momento





$$\tau_{//} = \frac{F_{//}}{a_g \cdot L_c}$$

Uniones sin momento: Varios cordones

$$\tau_{\perp} = \frac{F_{\perp}}{\sum_i a_{gi} \cdot L_{ci}} \qquad \tau_{//} = \frac{F_{//}}{\sum_i a_{gi} \cdot L_{ci}}$$

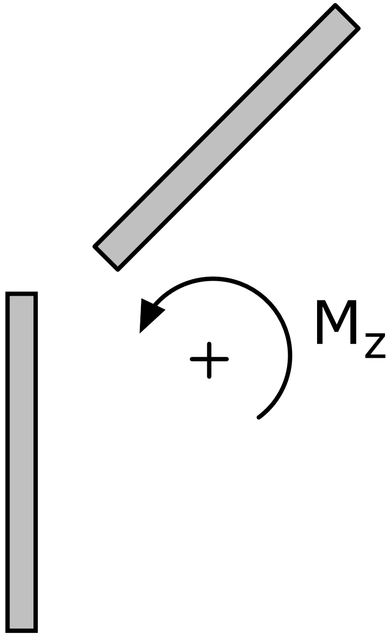
Comprobación de la unión

Solo $F_{\perp}$:

Solo $F_{//}$:

$F_{\perp}$ y $F_{//}$:

Uniones con momento: Varios cordones



(Mismo tratamiento que uniones atornilladas)

1.- Cálculo del baricentro

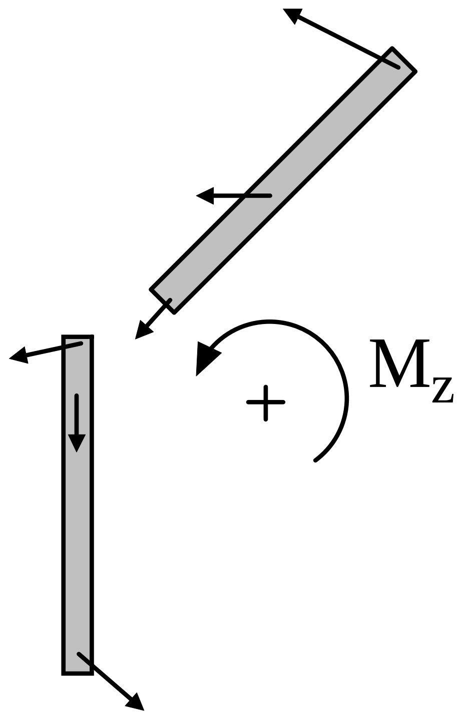
$$x'_G = \frac{\sum_i x'_{Gi} \cdot a_{gi} \cdot L_{ci}}{\sum_i a_{gi} \cdot L_{ci}} \qquad y'_G = \frac{\sum_i x'_{Gi} \cdot a_{gi} \cdot L_{ci}}{\sum_i a_{gi} \cdot L_{ci}}$$

2.- Cálculo de I_G

- Se desprecia la inercia respecto al eje del cordón
- Se emplea $I_G = I_x + I_y$ cuando conviene
- Se aplica Steiner

3.- Cálculo de τ

$$\vec{\tau} = \frac{M_z}{I_G}\left(\vec{k} \times \vec{r}\right)$$

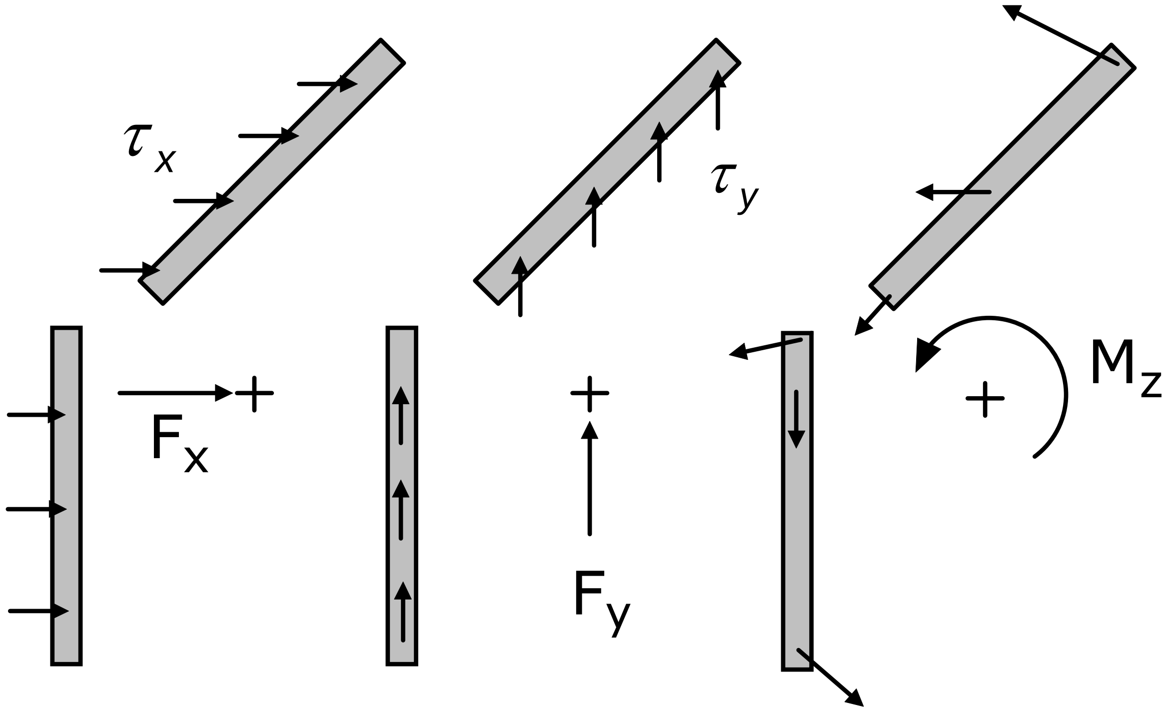


4.- Comprobación

$$\tau_{máx} < \tau_{adm}$$

Comprobación con fuerzas y momento

1.- Cálculo de tensiones



2.- Suma vectorial de las tensiones

3.- Comprobación $\tau_{máx} < \tau_{adm}$