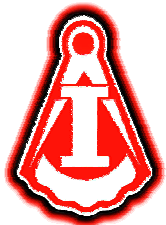
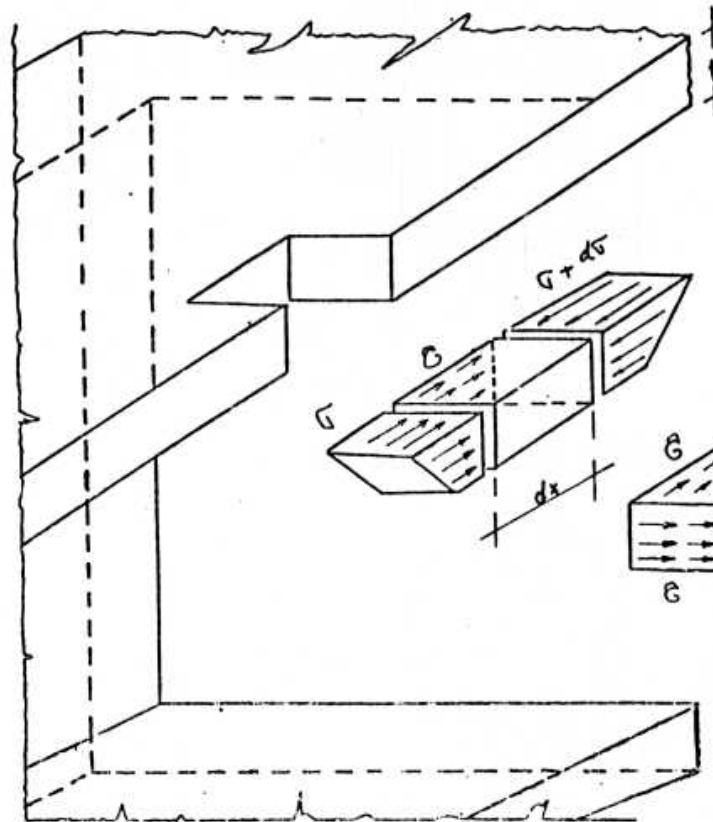
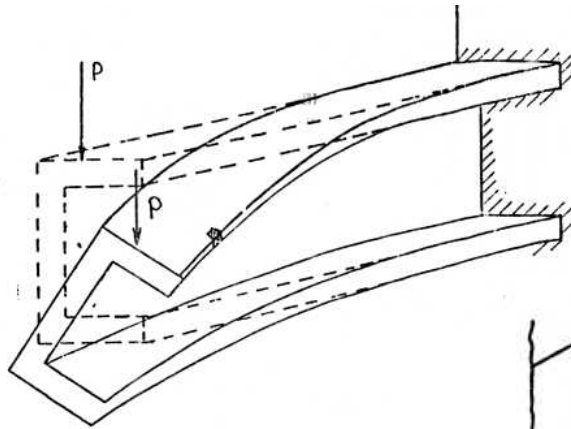

Vigas Perfiladas

Clase 10

Centro de Corte, Líneas de Tensión,
Vigas Armadas de madera, Ejercicios



Perfiles = Fuerza Cortante en las Alas

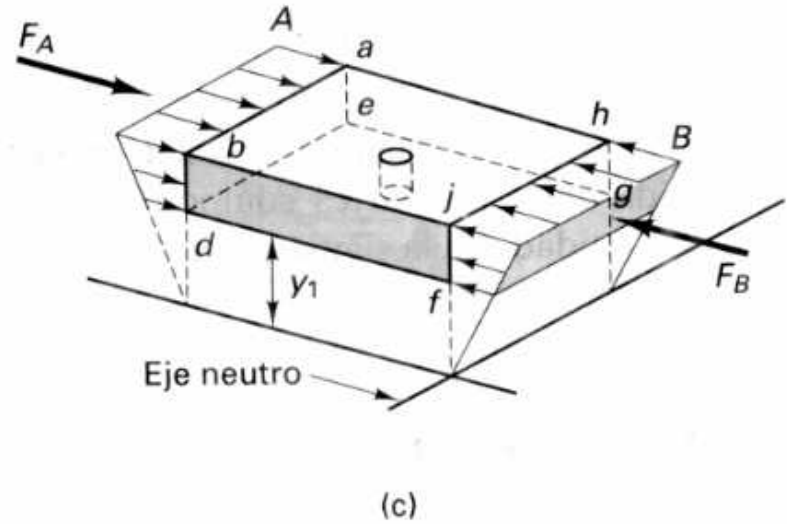
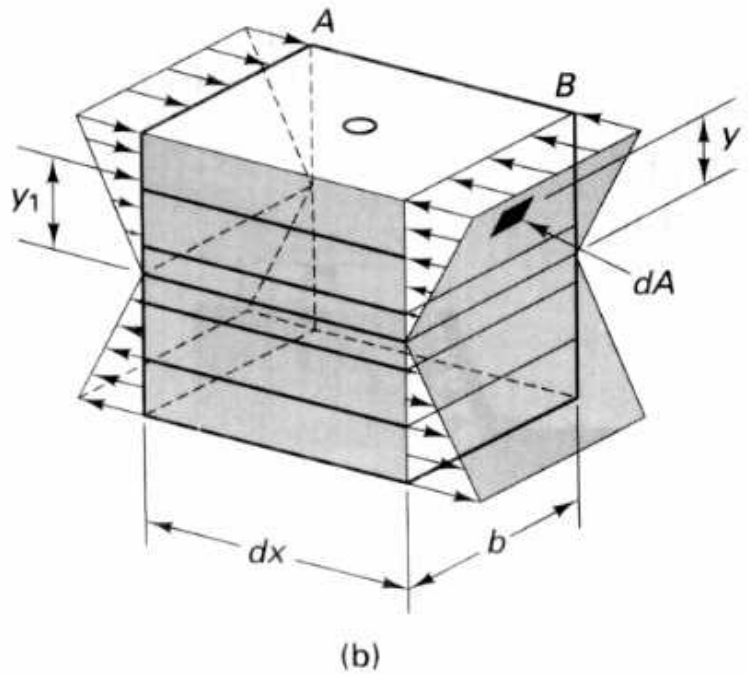
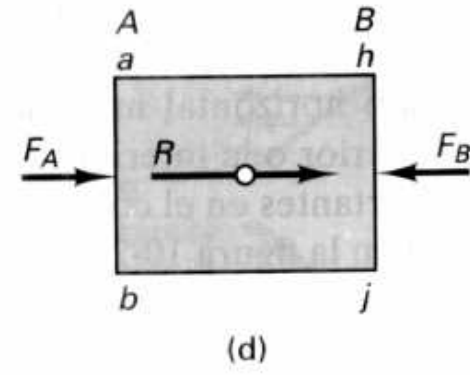
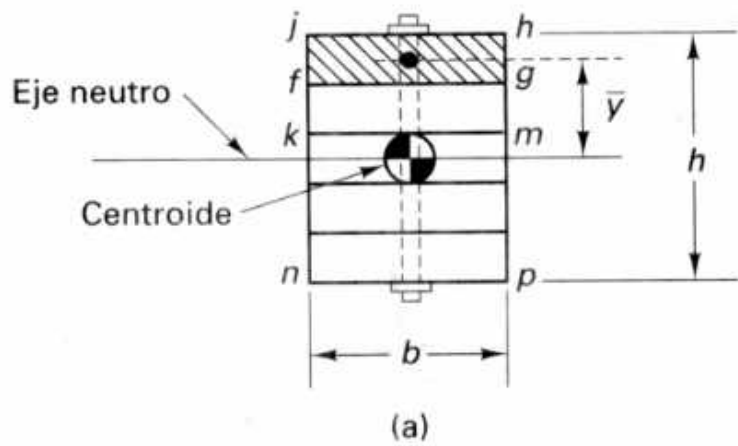


$$\int_{y_1}^{y_{max}} \tau dA + \tau t \cdot dx = \int_{y_1}^{y_{max}} (\tau + d\tau) dA$$

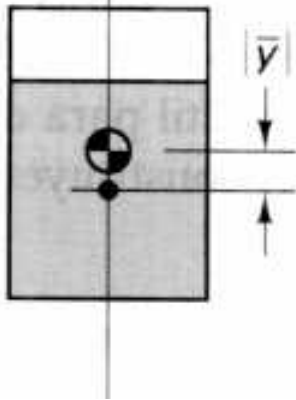
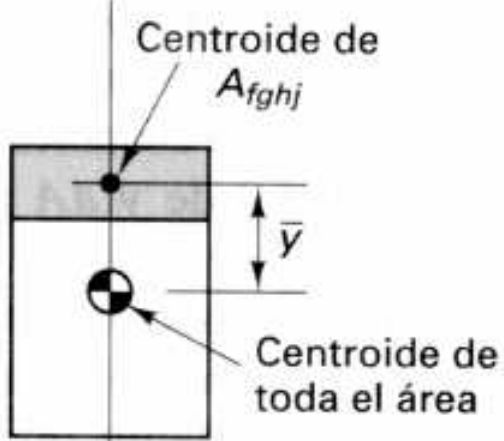
$$\int_{y_1}^{y_{max}} \frac{dH - y}{I_z} dA = \tau t dx$$

$$\tau \cdot t = \frac{V \cdot H_2}{I_z}$$

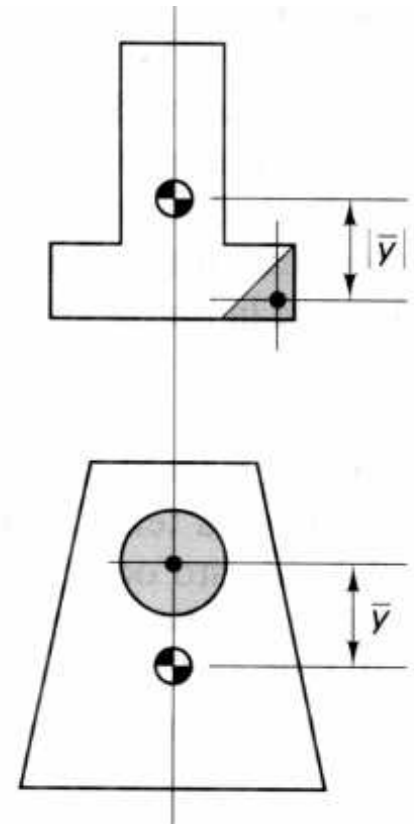
$$q = \tau t = \text{FLUJO DE CORTADURA}$$



Elementos para obtener el flujo cortante en una viga.



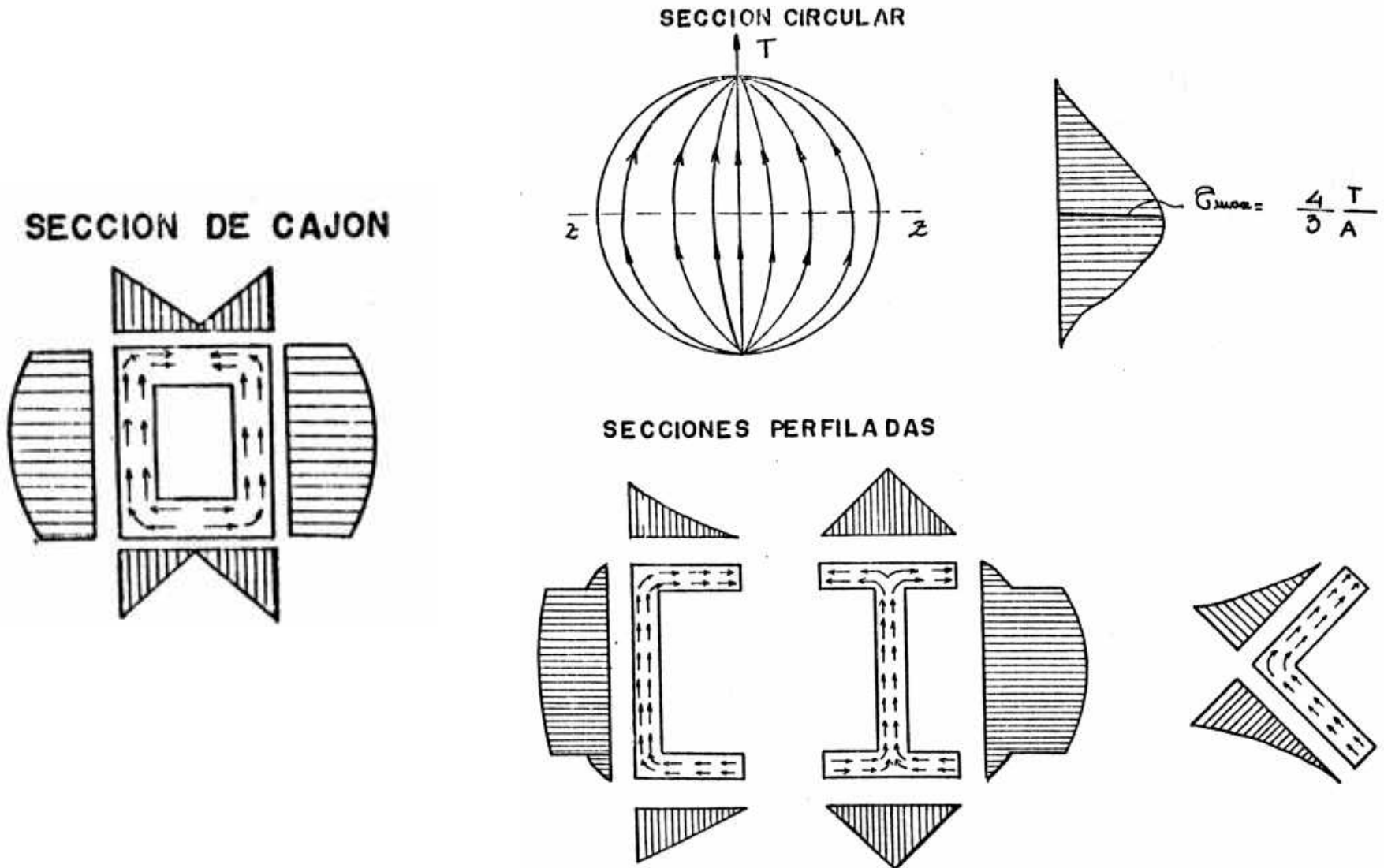
Las áreas
sombreadas
son A_{fghj}



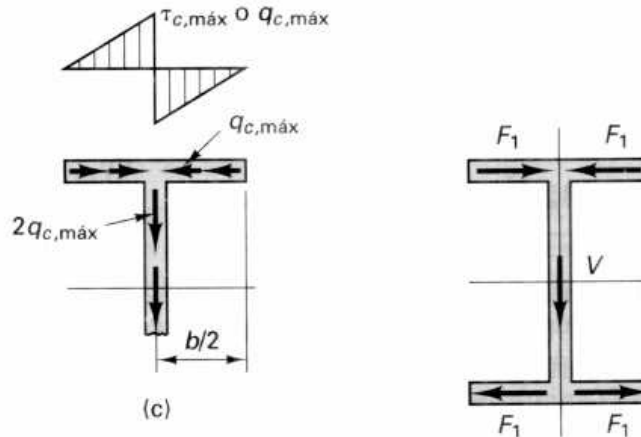
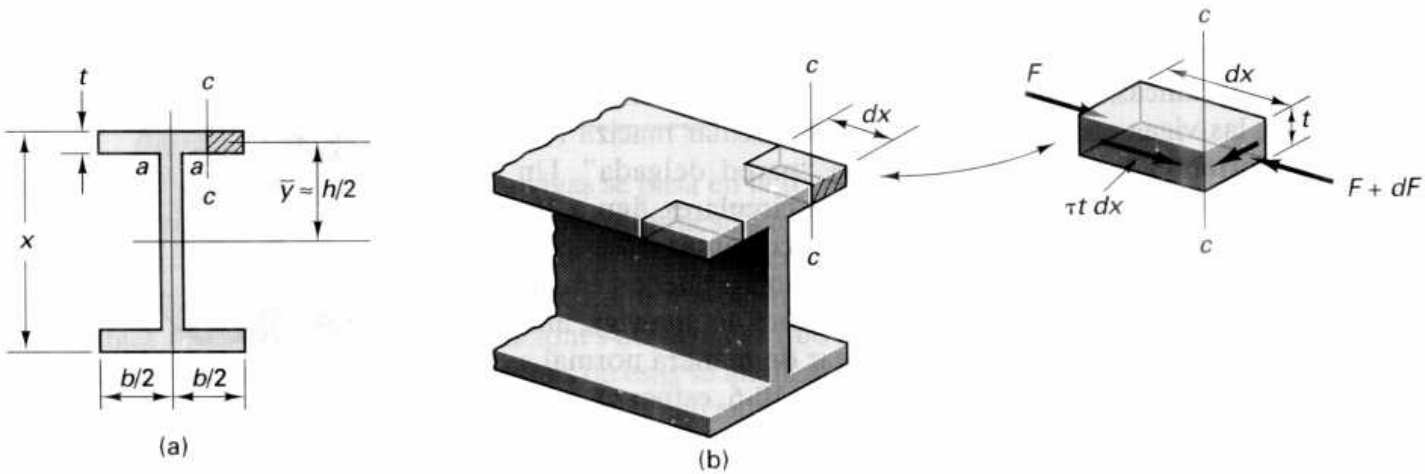
$$q = \frac{dF}{dx} = \frac{dM}{dx} \frac{1}{I} \int_{\text{área } fghj} y dA = \frac{VA_{fghj}\bar{y}}{I} = \frac{VQ}{I}$$

Procedimiento para
determinar “q”

Línea de Tensión

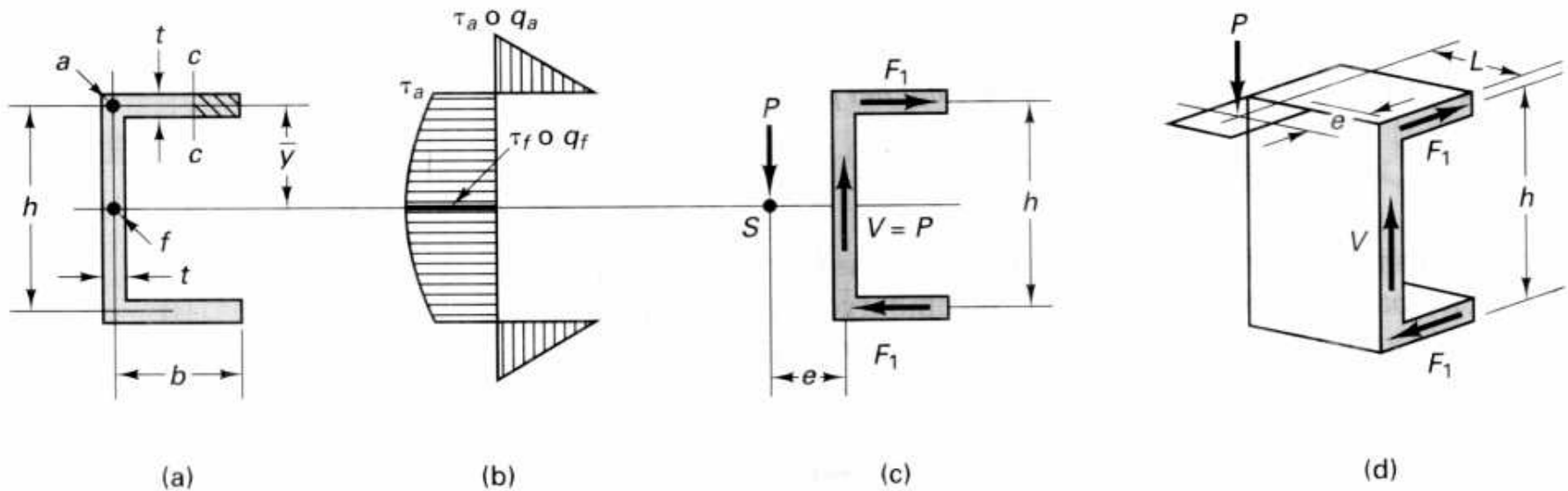


Línea de Tensión



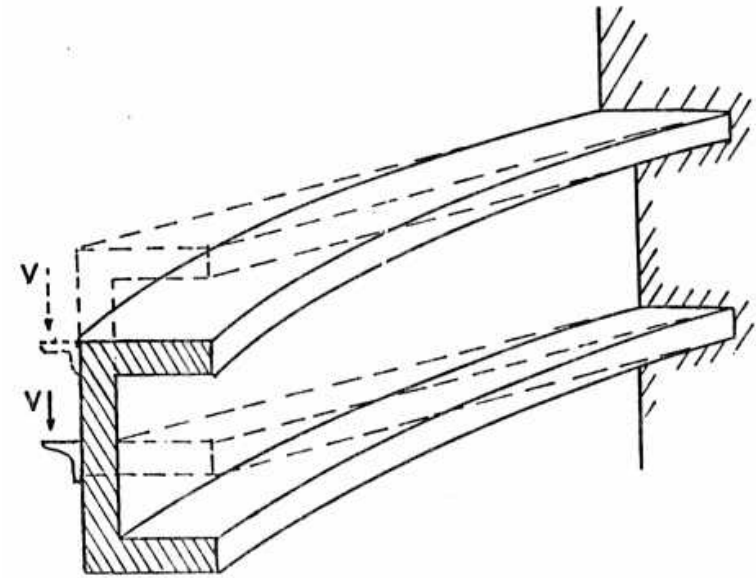
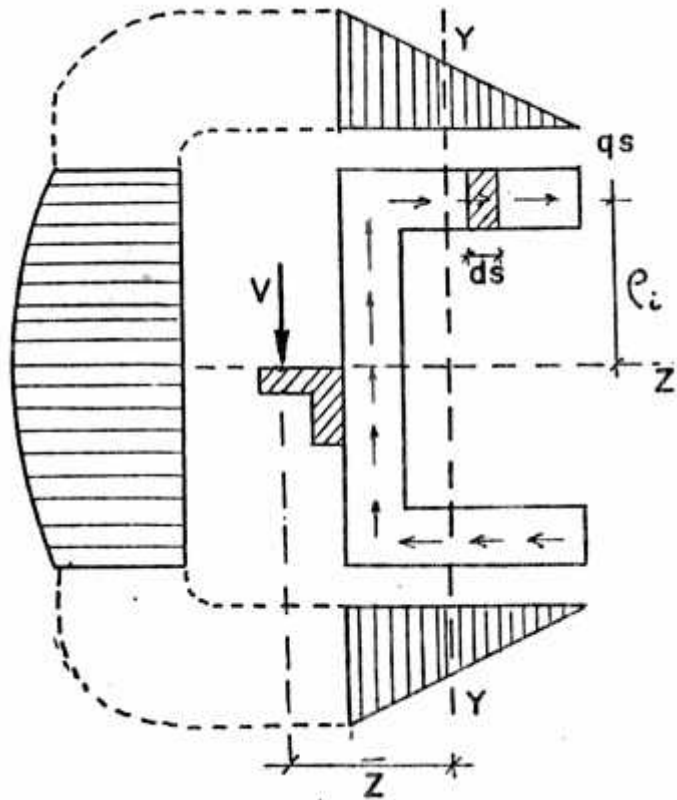
Fuerzas cortantes en los patines de una viga I actuando perpendicularmente al eje de simetría

Centro de Corte



Obtención de la posición del centro de cortante para un canal.

Centro de Corte

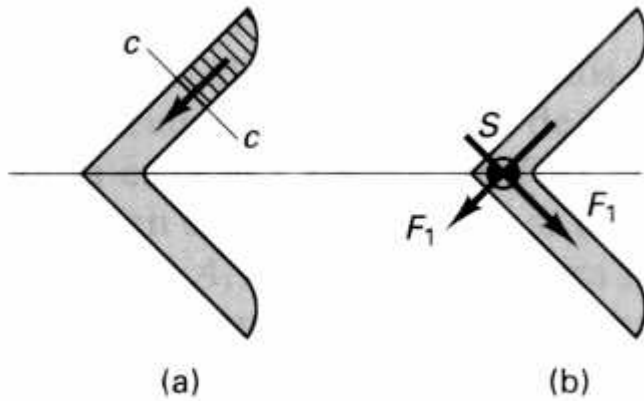


$$M_T = \int_s q_s \rho ds$$

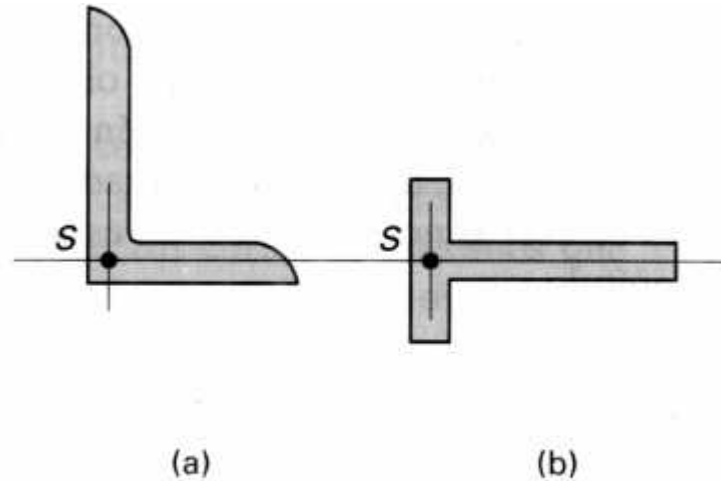
$$M_T = V \cdot \bar{z}$$

$$\bar{z} = \frac{M_T}{V}$$

Centro de Corte

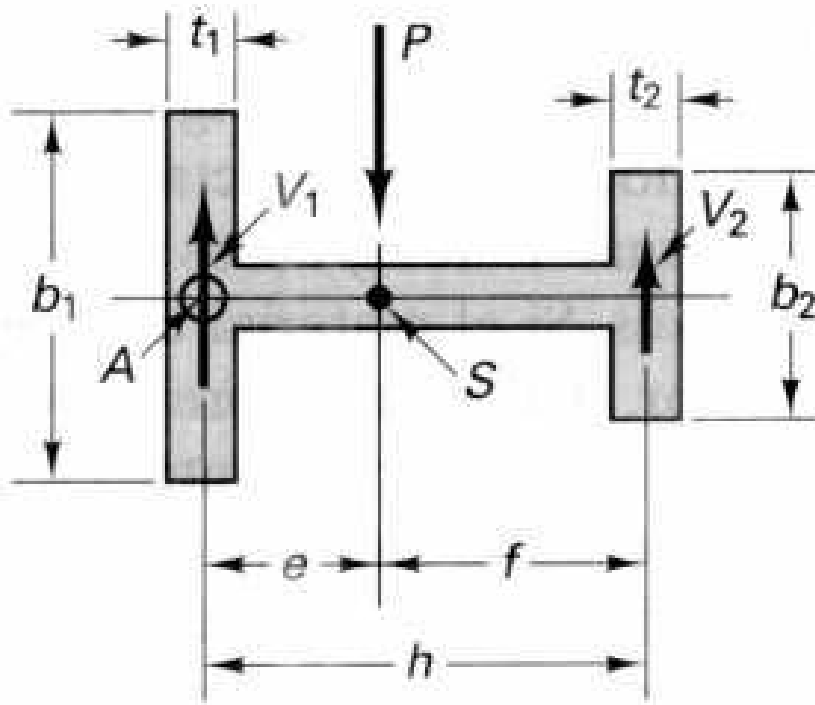


(a) (b)
El centro de cortante para un ángulo de lados iguales está en S .

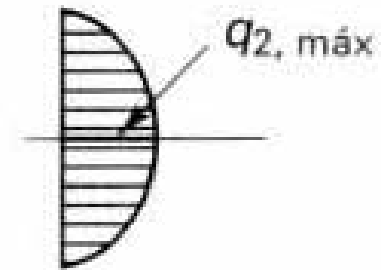


(a) (b)
El centro de cortante para las secciones mostradas está en S .

Centro de Corte



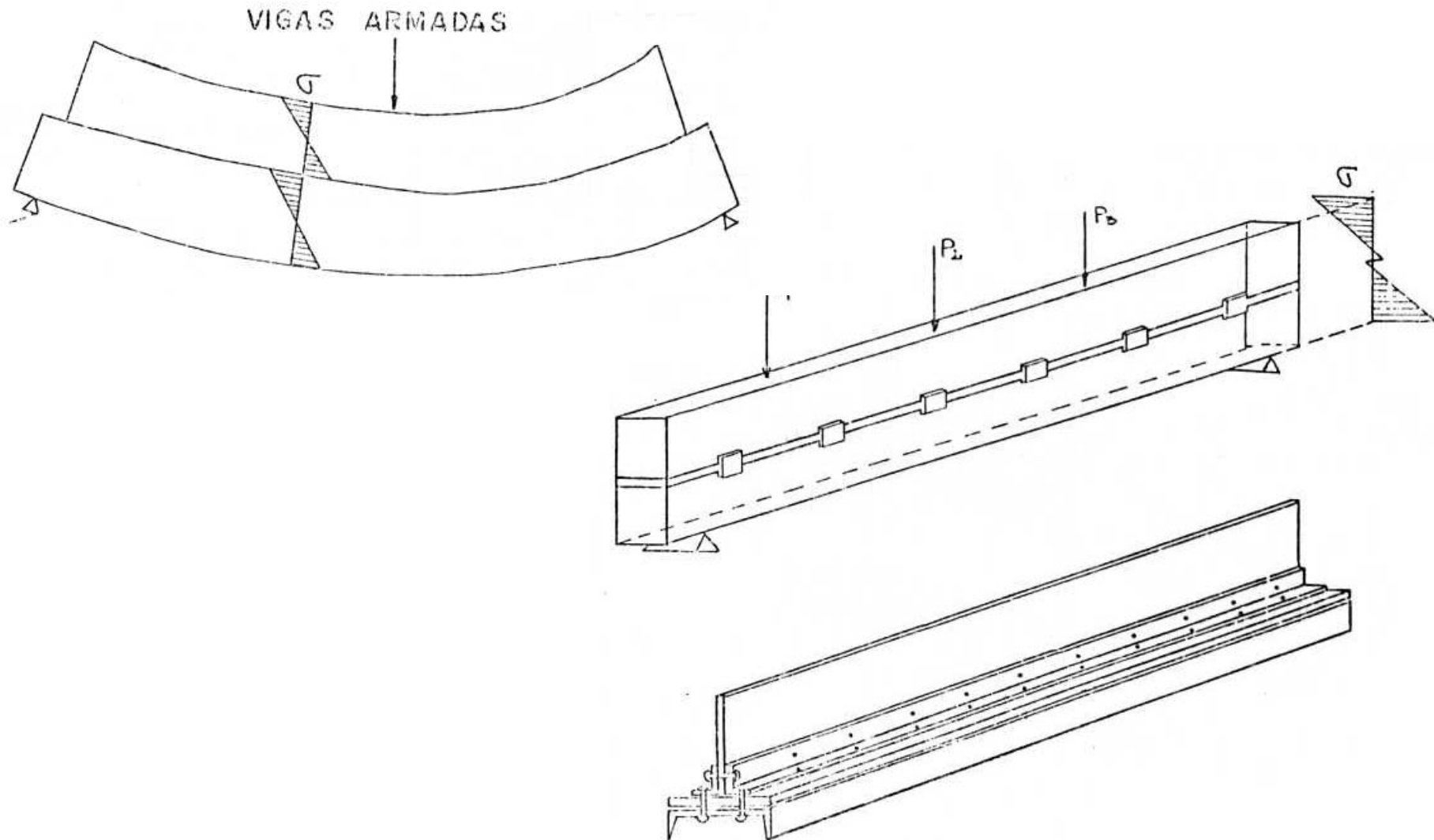
(a)



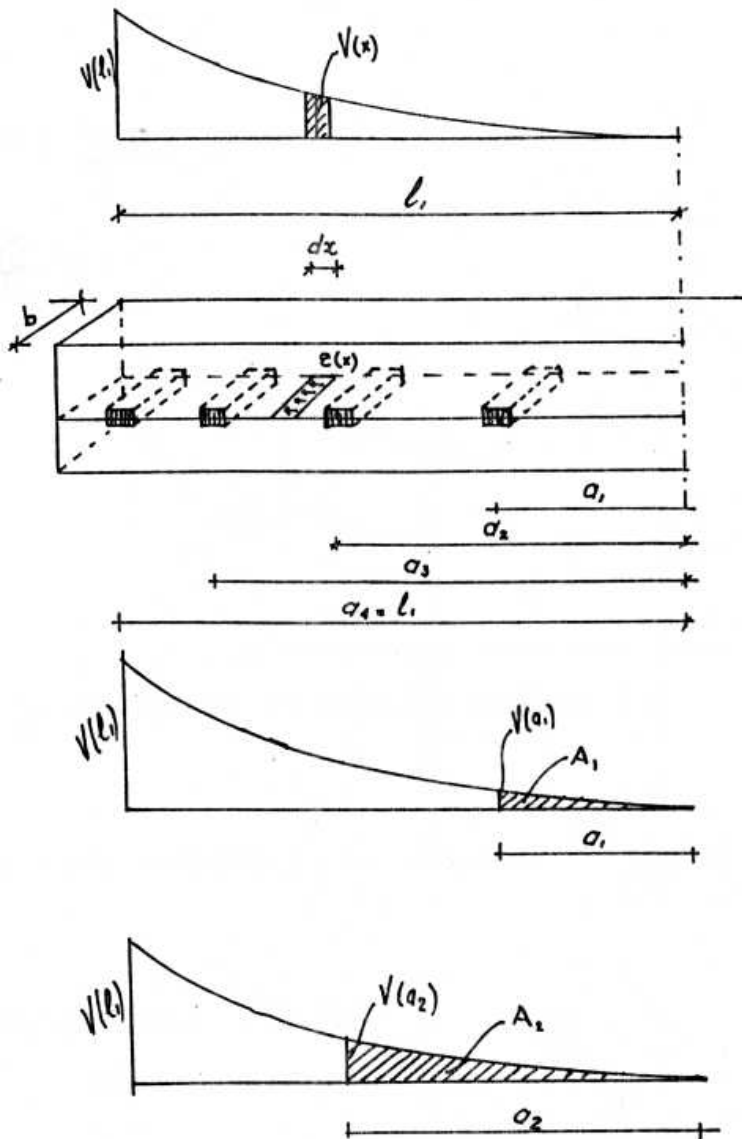
Flujo cortante en el patín derecho

(b)

Vigas armadas



Distribución de tacos en vigas armadas de madera



$$z = \frac{V(x) M_{cut}}{b I_e}$$

$$F_t = F_1 = F_2 = F_3 = \dots = F_n$$

$$\eta = \frac{F_T}{F_t}$$

$$\eta = \frac{F_T}{F_t} = \frac{\int_0^{l_1} z(x) b dx}{\int_0^{a_1} z(x) b dx} = \frac{M_{cut}}{b I_e} \frac{\int_0^{l_1} V(x) dx}{\int_0^{a_1} V(x) dx}$$

$$\eta = \frac{A_T}{A_1}$$

$$A_1 = \frac{A_T}{\eta}$$

$$A_2 = 2A_1 = \frac{2A_T}{\eta}$$

$$A_3 = 3A_1 = \frac{3A_T}{\eta}$$

$$A_n = \eta A_1 = A_T$$

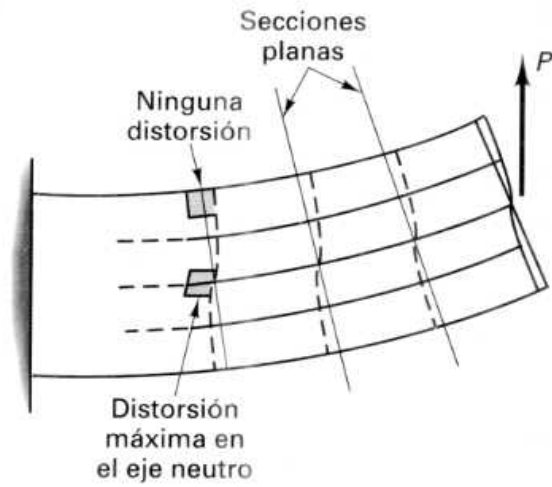


Fig. 10-12 Distorsiones por cortante en una viga.

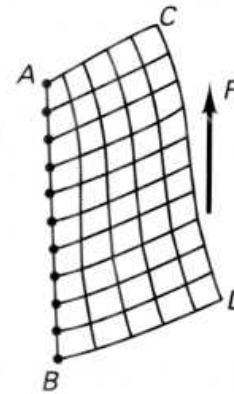


Fig. 10-13 Red deformada para un voladizo corto de una solución por elemento finito.

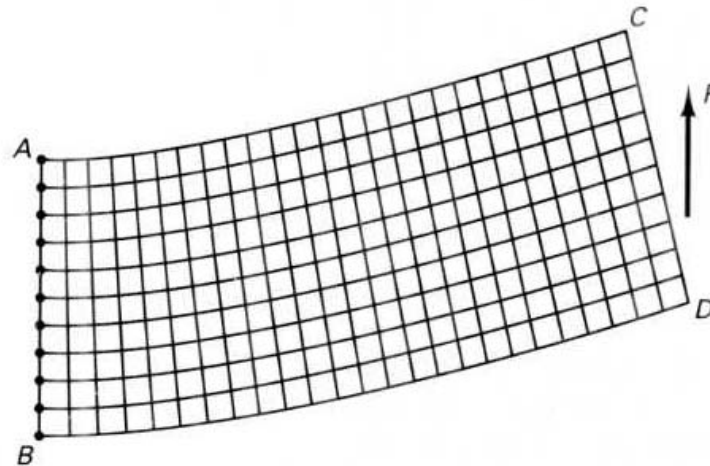


Fig. 10-14 Solución por elemento finito que muestra la deformación de un voladizo moderadamente largo.

Próxima Clase: Deformación en la flexión

Fin