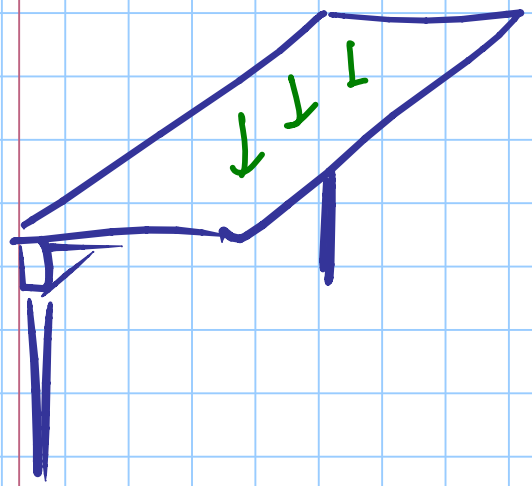
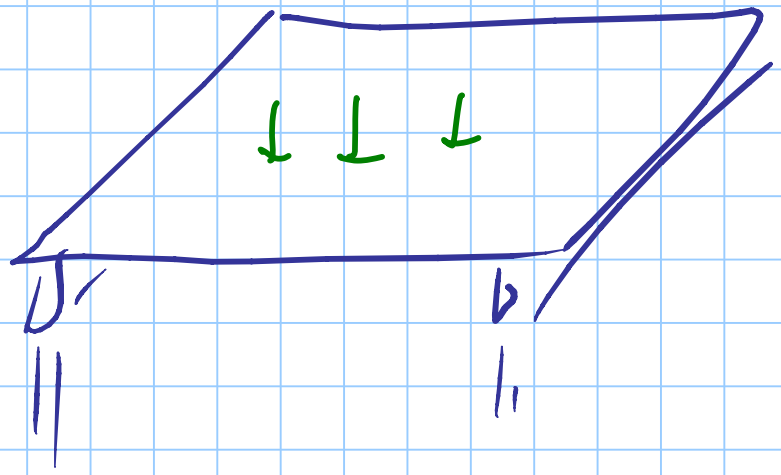
TORSIONE

Titolo nota 17/12/2013

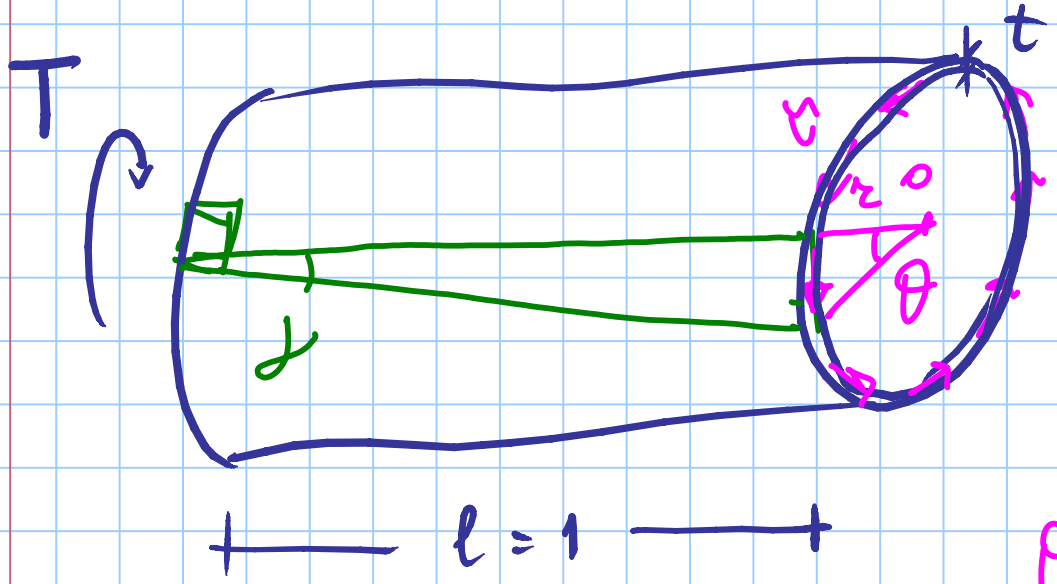
per equilibrio



per congruenza



si può trascurare



T

SEZIONE ANULARE

θ angolo di rotazione unitaria

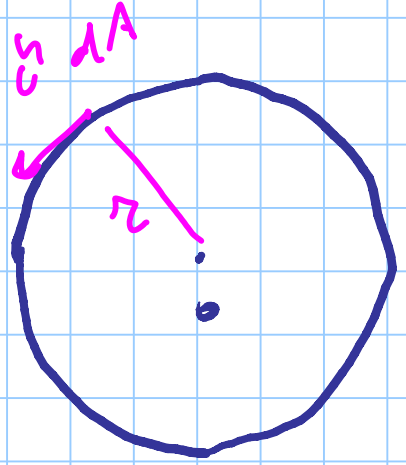
$\tau = G\gamma$

$1 \cdot \gamma = r\theta$

$\tau = G r \theta$

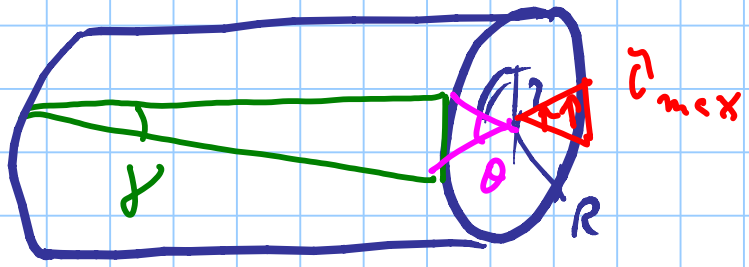
$$T = \int \tau \, dA \, r =$$

$$= \frac{\tau}{r} \int r^2 \, dA = \frac{\tau \, I_p}{r}$$



I_p ($= I_t$) momento d'inerzia polare

SEZIONE CIRCOLARE PIENA



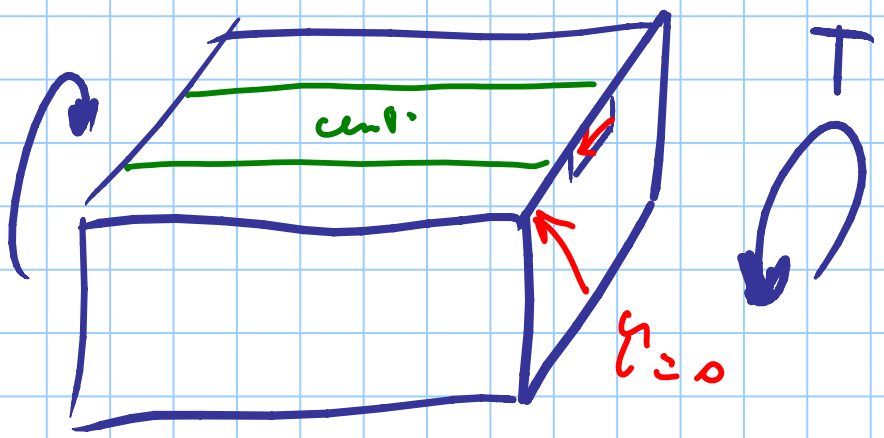
$$\tau = \tau_{max} \frac{r}{R}$$

$$T = \int \tau \, dA \cdot r = \int \frac{\tau_{max}}{R} r^2 \, dA = \frac{\tau_{max}}{R} I_p$$

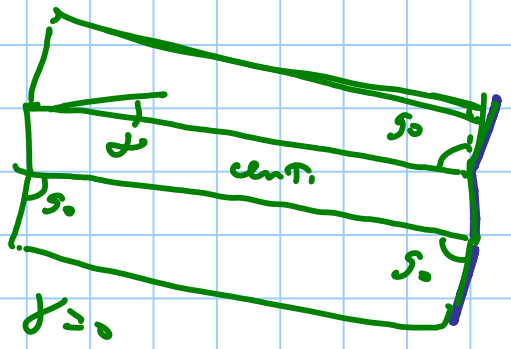
$\tau_{max} = \frac{\psi T}{a b^2}$

$a \geq b$

SEZIONE RETTANGOLARE

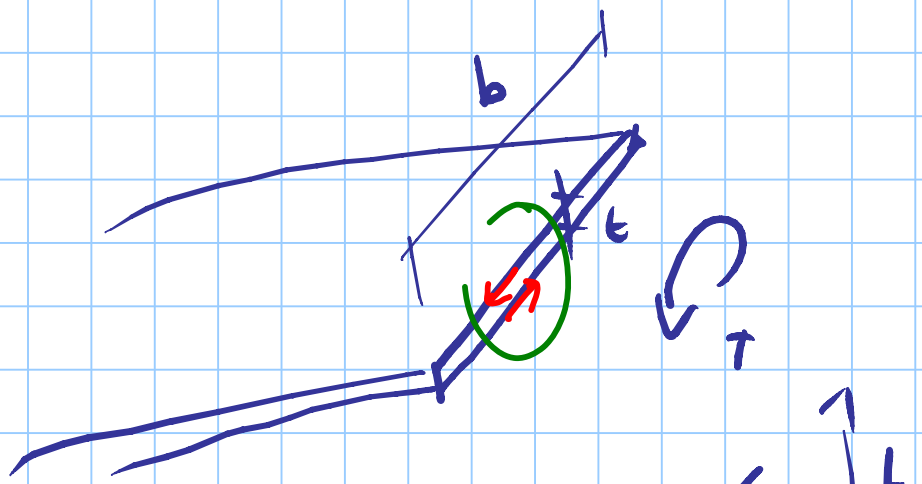


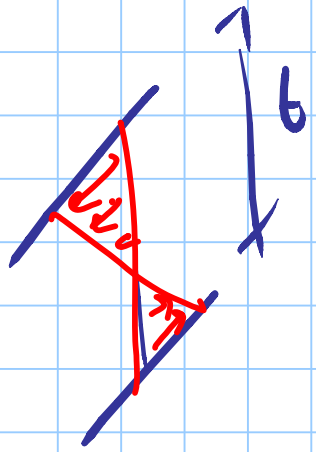
dell'elt



spostamenti fuori piano

SEZIONE RETTANGOLARE SOTTILE

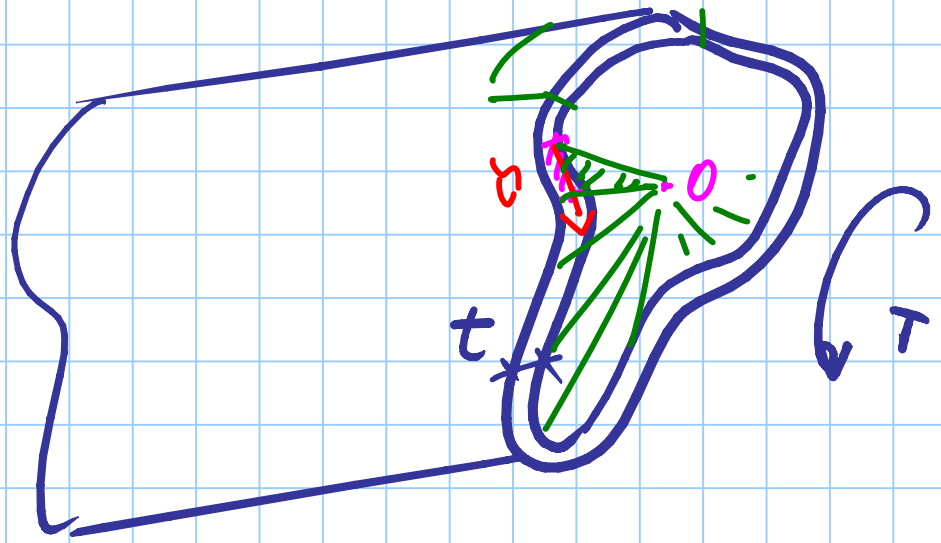




$$\tau = \frac{3T}{bt^2}$$

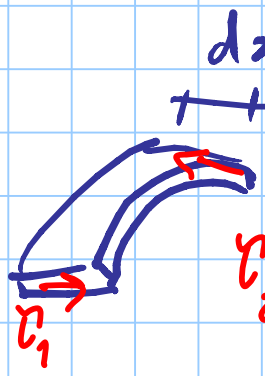
x la sezione è formata da più rettangoli $\sum bxt$ APERTA

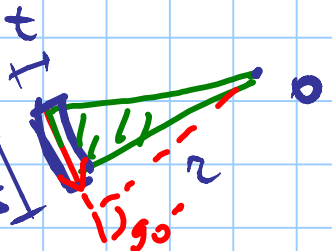
SEZIONE SOTTILE CHIUSA



$$\tau_1 t_1 = \tau_2 t_2$$

$\tau t = \text{cost}$





$$T = \int \tau t \, ds \, r$$

$2A$

$$\text{Area Triang.lo} = \frac{\text{base} \times \text{altez.}}{2} = \frac{ds \cdot r}{2}$$

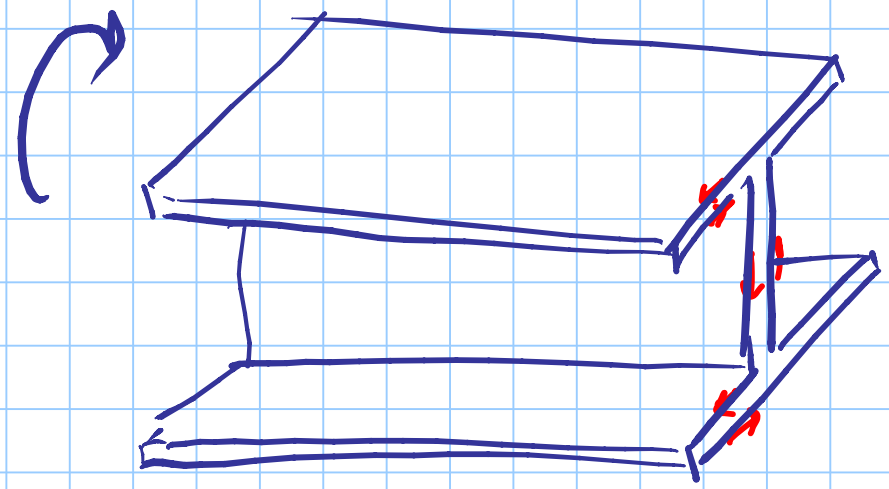
$$T = U \cdot 2A_k$$

$$U = \frac{T}{2 \cdot A_k}$$

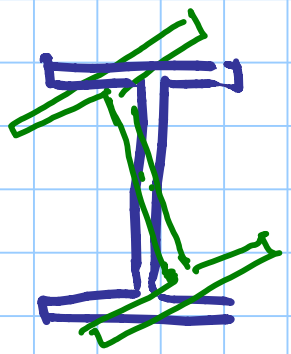
formule di BREDT

SEZIONE

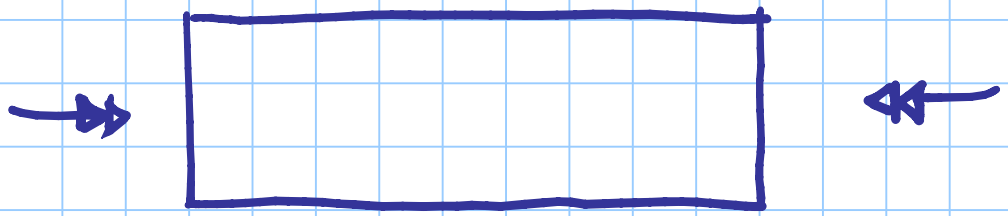
T



T

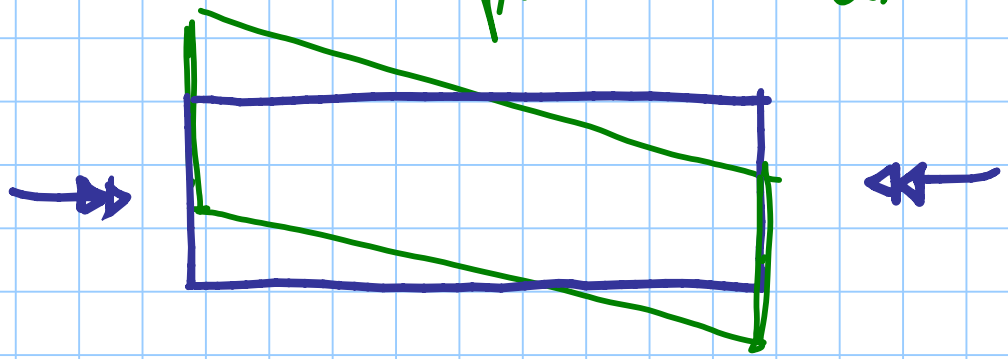


dell'el



può essere così? ala sup.

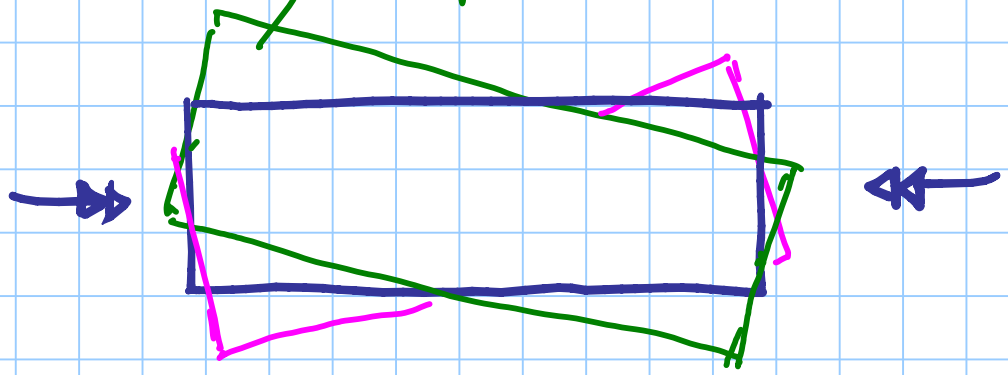
dall'alt



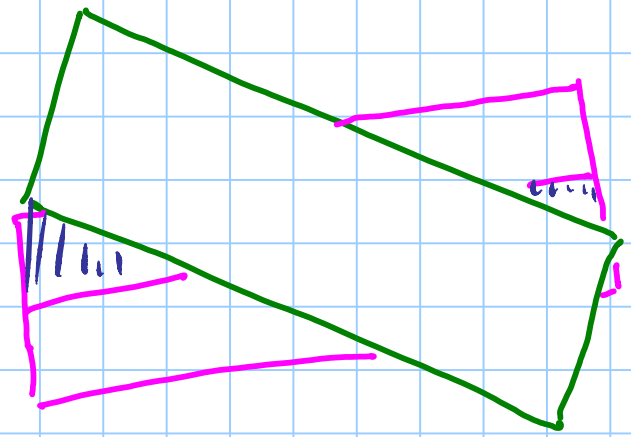
No perché c'è γ

ala sup.

dall'alt

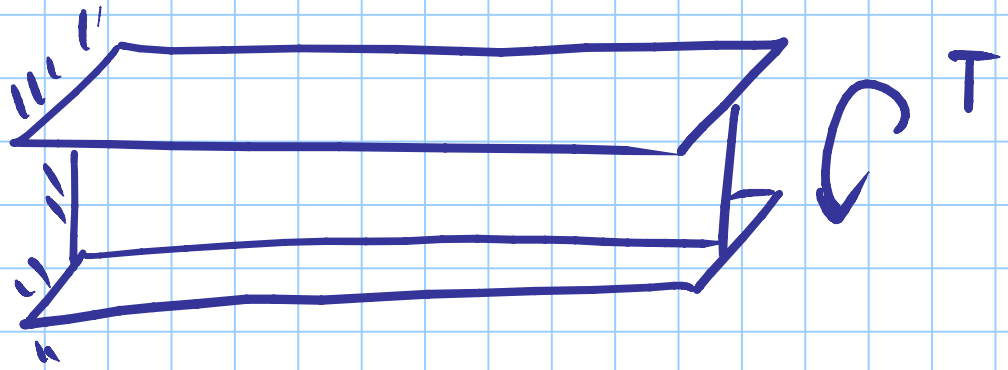


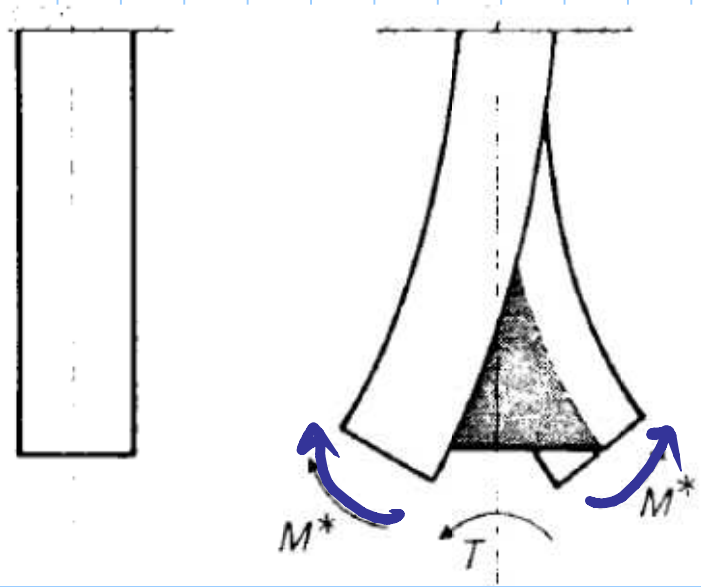
è così perché $\gamma = 0$
nelle linee medie



SVERGOLAMENTO

WARPING





le ali si deformano

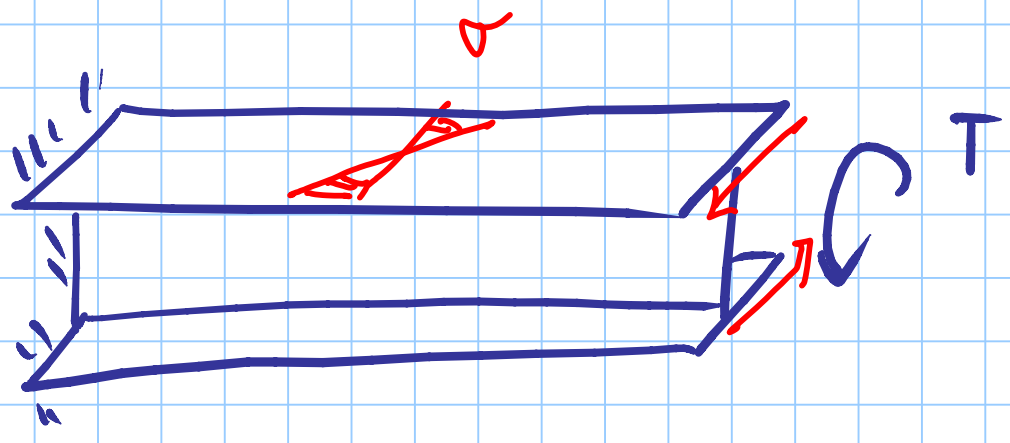
TORSIONE

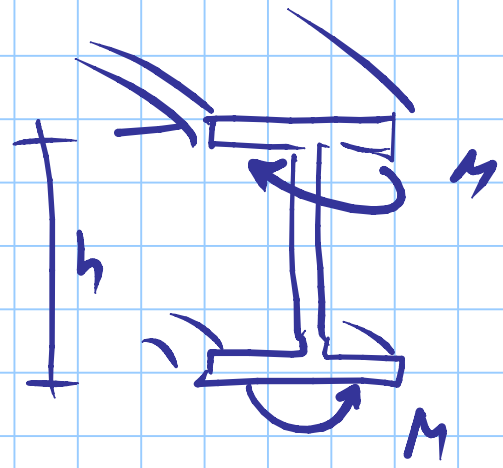
- PRIMARIA — alla De Saint Venant

- SECONDARIA — (ingobbamento impedito)

  alla Vlasov

  teoria delle aree settoriali





$$\sigma = \frac{B}{I_w}\,\omega$$

$$B = M\,h$$

bimomento

RESISTENZA A TORSIONE

PROFILI CHIUSI

$$\tau = \frac{T}{2 t A_k} \leq \frac{f_y/\sqrt{3}}{\gamma_{M0}}$$

$$T_{Rd} = 2 t A_k \frac{f_y/\sqrt{3}}{\gamma_{M0}}$$