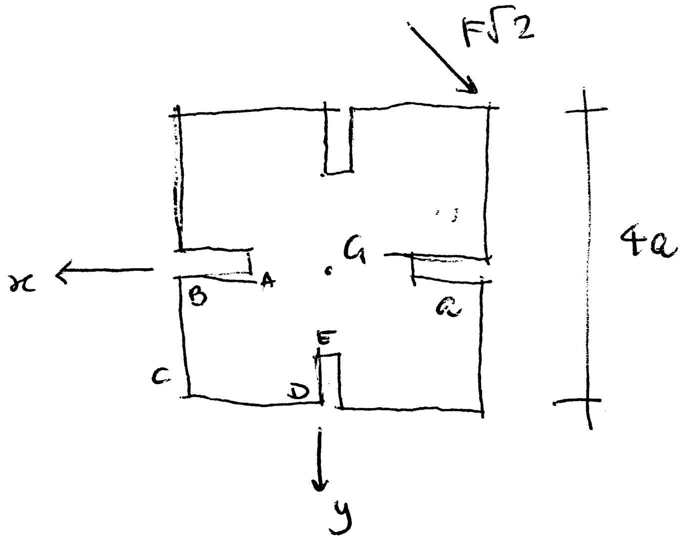
(4 aini)



$$J_x = 2 \cdot \frac{1}{12}(4a)^3 t + 2 \cdot \frac{1}{12} a^3 \cdot 2t + 2 \cdot 4at \cdot (2a)^2 + 2 \cdot (a \cdot 2t)\left(\frac{3}{2}a\right)^2 = \left(\frac{32}{3} + \frac{1}{3} + 32 + 9\right) a^3 t =$$

$$= 52 a^3 t$$

Taglio lungo y: $(T_y = F)$

DE) $\tau_{zy} = -\frac{F}{tJ_x}(y-a)t\frac{(y+a)}{2} = -\frac{F}{2J_x}(y^2 - a^2)$

CD) $\tau_{zx} = -\frac{F}{tJ_x}\left(\frac{3}{2}a^2 t + xt \cdot 2a\right) = -\frac{F}{2J_x}(3a^2 + 4ax)$

BC) $\tau_{zy} = \frac{F}{2J_x}(15a^2 - y^2)$

AB) $\tau_{zx} = \frac{F}{2J_x} \cdot 15a^2$

Taglio lungo x: $(T_x = -F)$

AB) $\tau_{zx} = \frac{F}{2J_x}(x^2 - a^2)$

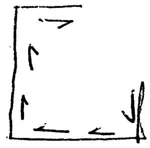
BC) $\tau_{zy} = \frac{F}{2J_x}(3a^2 + 4ay)$

CD) $\tau_{zx} = -\frac{F}{2J_x}(15a^2 - x^2)$

DE) $\tau_{zy} = -\frac{F}{2J_x} \cdot 15a^2$

Mom torcente $\quad (M_T = F\sqrt{2} \cdot 2a\sqrt{2} = 4Fa)$

$$\tau_M = \frac{4Fa}{2 \cdot (4a \cdot 4a) \cdot t} = \frac{F}{8at}$$



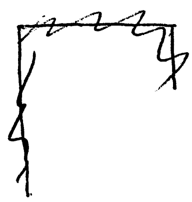
Tensioni tangenziali complessive

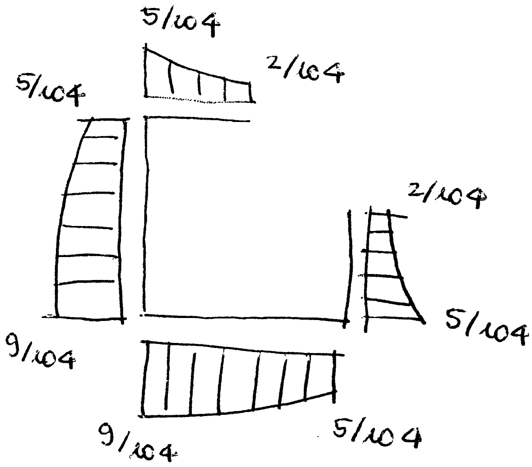
AB) $\tau_{zx} = \frac{F}{2J_x}(14a^2 + x^2) - \frac{F}{8at} = \frac{F(14a^2+x^2)}{104a^3t} - \frac{F}{8at} = \frac{F}{104a^3t}(a^2+x^2)$

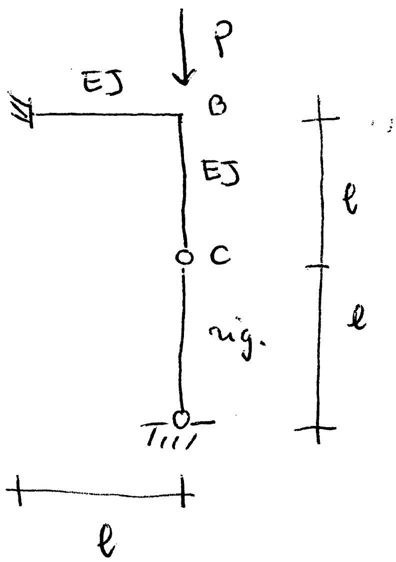
BC) $\tau_{zy} = \frac{F}{2J_x}(18a^2+4ay-y^2) - \frac{F}{8at} = \frac{F}{104a^3t}(5a^2+4ay-y^2)$

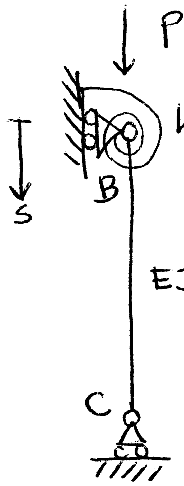
CD) $\tau_{zx} = -\frac{F}{2J_x}(18a^2+4ax-x^2) + \frac{F}{8at} = -\frac{F}{104a^3t}(5a^2+4ax-x^2)$

DE) $\tau_{zy} = -\frac{F}{2J_x}(14a^2+y^2) + \frac{F}{8at} = -\frac{F}{104a^3t}(a^2+y^2)$









$\left(k = \dfrac{4EJ}{\ell} \right)$ non richiesto

$$\begin{cases} v(0) = 0 \\ -EJ\, v''(0) = -k\, v'(0) \\ v''(\ell) = 0 \\ -EJ\, v'''(\ell) = P\, v'(\ell) \end{cases}$$