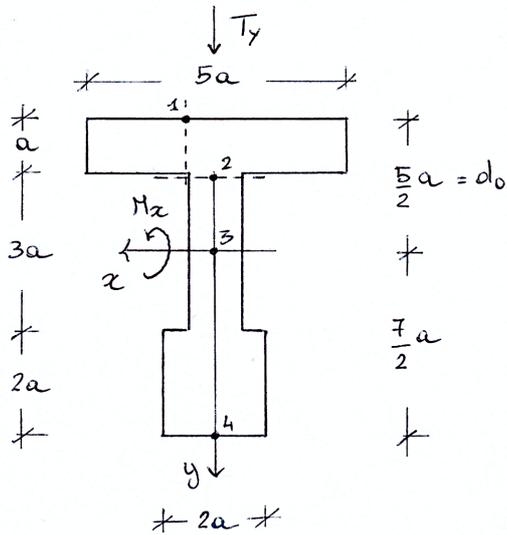


Prova scritta del 03 novembre 2020 - Sintesi Soluzione

PROBLEMA 1



$$M_x = 10 T_y a$$

$$a) d_0 = \frac{5a}{2}$$

$$b) J_x = 49 a^4$$

c) Punto 1:  $\sigma_z = -\frac{25 T_y}{49 a^2}$ ,  $\tau_{zx} = \frac{4 T_y}{49 a^2}$ ,  $\tau_{zy} = 0$

Punto 2:  $\sigma_z = -\frac{15 T_y}{49 a^2}$ ,  $\tau_{zx} = 0$ ,  $\tau_{zy} = \frac{10 T_y}{49 a^2}$

Punto 3:  $\sigma_z = 0$ ,  $\tau_{zx} = 0$ ,  $\tau_{zy} = \frac{89 T_y}{392 a^2}$

Punto 4:  $\sigma_z = \frac{35 T_y}{49 a^2}$ ,  $\tau_{zx} = 0$ ,  $\tau_{zy} = 0$

d)  $\sigma_I = \frac{89 T_y}{392 a^2}$ ,  $\sigma_{II} = 0$ ,  $\sigma_{III} = -\frac{89 T_y}{392 a^2}$

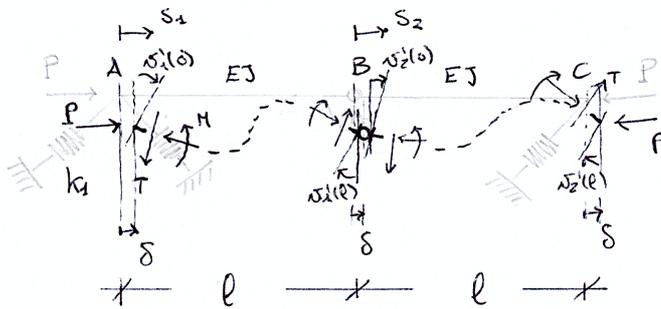
e)  $\sigma_{id}^{(1)} \approx 0,54 \frac{T_y}{a^2}$ ,  $\sigma_{id}^{(2)} \approx 0,51 \frac{T_y}{a^2}$

$\sigma_{id}^{(3)} \approx 0,45 \frac{T_y}{a^2}$ ,  $\sigma_{id}^{(4)} \approx 0,71 \frac{T_y}{a^2}$

$$T_y^{\max} = \frac{49}{35} \sigma_0 a^2$$

PROBLEMA 2

a)



eq. mi diff. li

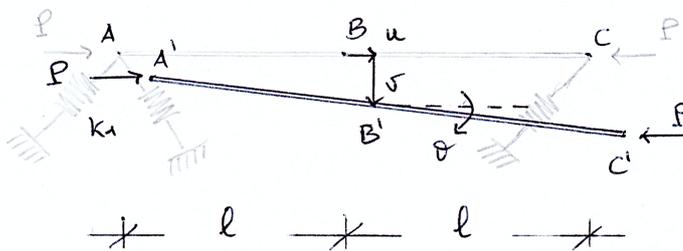
$$\begin{cases} EJ\vartheta_1'''' + P\vartheta_1'' = 0 \\ EJ\vartheta_2'''' + P\vartheta_2'' = 0 \end{cases}$$

a.b.

$$\begin{aligned} \vartheta_1''(0) &= 0, \quad EJ\vartheta_1'''(0) + P\vartheta_1'(0) + k_1\vartheta_1(0) = 0, \quad \vartheta_1(l) = \vartheta_2(0), \\ \vartheta_1''(l) &= \vartheta_2''(0), \quad -EJ\vartheta_1'''(l) + k_0(\vartheta_2'(0) - \vartheta_1'(l)) = 0, \\ -EJ\vartheta_1''''(l) + EJ\vartheta_2''''(0) - P(\vartheta_1'(l) - \vartheta_2'(0)) &= 0, \quad \vartheta_2''(l) = 0, \\ -EJ\vartheta_2''''(l) - P\vartheta_2'(l) + \frac{k_1}{2}(\vartheta_2(l) - \delta) &= 0, \quad 3\delta = \vartheta_2(l) \end{aligned}$$

b)  $k_0 = 0 \rightarrow P_{cr} = 0$

$k_0 \rightarrow +\infty$



$$\begin{aligned} \vartheta_A &= \vartheta - \theta l \\ \vartheta_C &= \vartheta + \theta l \\ u_A &= u_C = u \end{aligned}$$

$$\begin{cases} -3u + \vartheta + \theta l = 0 \\ 3\vartheta - u - \theta l = 0 \\ 2P\theta l - k_1\vartheta l - k_1\theta l^2 + k_1 u l = 0 \end{cases}$$

$$P_{cr} = \frac{k_1 l}{2}$$