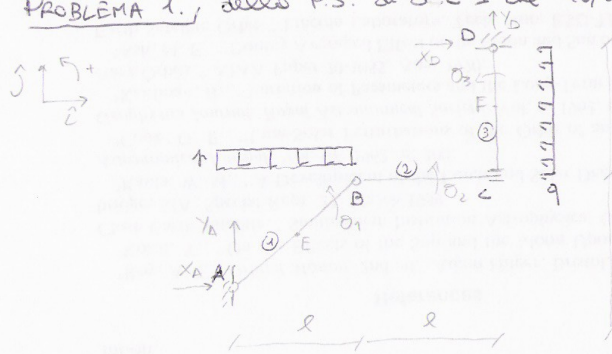
PROBLEMA 1. dello P.S. di S.C I del 10/06/2005



C. VINCOLO

$$\begin{cases} \underline{u}_A = 0 \\ \underline{u}_D = 0 \\ \underline{u}_C \cdot \hat{j} = 0 \end{cases}$$

$$\begin{array}{ccc} \hat{i} & \hat{j} & \hat{k} \\ 0 & 0 & \theta_3 \\ 0 & -\ell & 0 \end{array}$$

$$\underline{u}_B = \underset{0}{\cancel{\underline{u}_A}} + \theta_1 \hat{k} \wedge \vec{AB} = -\ell\theta_1 \hat{i} + \ell\theta_1 \hat{j}$$

$$\underline{u}_C^{(2)} = \underline{u}_B + \theta_2 \hat{k} \wedge \vec{BC} = -\ell\theta_1 \hat{i} + \ell(\theta_1 + \theta_2)\hat{j}$$

$$\underline{u}_C^{(3)} = \underset{0}{\cancel{\underline{u}_D}} + \theta_3 \hat{k} \wedge \vec{DC} = \ell\theta_3 \hat{i}$$

$$\underline{u}_C^{(2)} = \underline{u}_C^{(3)} \Rightarrow \begin{cases} \boxed{\theta_3 = -\theta_1} \\ \theta_1 + \theta_2 = 0 \Rightarrow \boxed{\theta_2 = -\theta_1} \end{cases}$$

$$\underline{u}_E = \left(-\frac{\ell}{2}\theta_1 \,;\, \frac{\ell}{2}\theta_1\right)$$

$$\underline{u}_F = \left(-\frac{\ell}{2}\theta_1 \,;\, 0\right)$$

Per il TLV:

$$\left(+\frac{\ell}{2}\theta_1\right)(-p\ell) + \left(-\frac{\ell}{2}\theta_1\right)(-q\ell) = 0$$

$$\Rightarrow \boxed{q = +p}$$

Per determinare le CdS della struttura, devo prima determinare le reazioni vincolari.
Per le eq.ni di equilibrio dello statico:

$$\begin{cases} (x)\; X_A + X_D = p\ell \\ (y)\; Y_A + Y_D = p\ell \\ (A)\; -2\ell X_D + 2\ell Y_D - p\ell\frac{\ell}{2} + p\ell\frac{3}{2}\ell = 0 \end{cases} \Rightarrow \begin{cases} X_A + X_D = p\ell \\ Y_A + Y_D = p\ell \\ 2X_D - 2Y_D = p\ell \end{cases}$$

Serve un'eq.ne ausiliaria. Utilizziamo lo sconnessione in B.
x l'eq. della rotazione asta (1) intorno a B.

$$X_A\ell - Y_A\ell + p\ell\frac{\ell}{2} = 0$$

$$X_A = Y_A - \frac{p\ell}{2}$$

che sostituita nell'eq.ni dello statico

$$\begin{cases} Y_A - \frac{p\ell}{2} + X_D = p\ell \\ Y_D = p\ell - Y_A \\ 2X_D - 2Y_D = p\ell \end{cases} \Rightarrow \begin{cases} X_D = \frac{3}{2}p\ell - Y_A \\ Y_D = p\ell - Y_A \\ 3p\ell - 2Y_A - 2p\ell + 2Y_A = p\ell \end{cases}$$

NO! L'eq.ne aux. è linearm. dipendente dalle 3 eq.ni dello statico. Devo trovare un'altra eq.ne aux.
Pongo l'equilibrio alla traslazione lungo (x) asta (3)

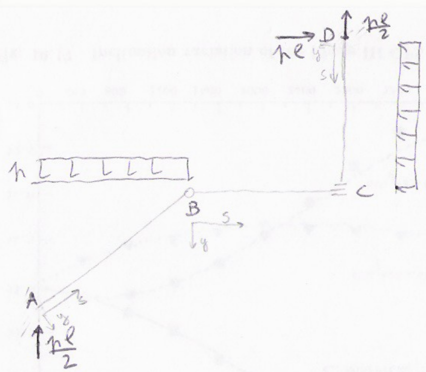
$$-p\ell + X_D = 0 \Rightarrow \boxed{X_D = p\ell}$$

Sostituisco e trovo

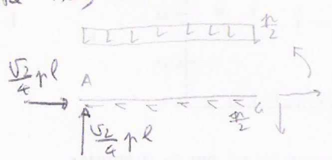
$$\boxed{X_A = 0}$$

$$\boxed{Y_D = \frac{p\ell}{2}}$$

$$\boxed{Y_A = \frac{p\ell}{2}}$$



Asta AB, $s \in [0, \sqrt{2}\ell]$

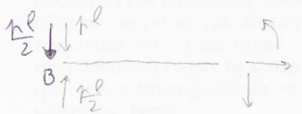


$$\begin{cases} N(s) = -\frac{\sqrt{2}}{4} q\ell + \frac{q}{2} s \\ T(s) = \frac{\sqrt{2}}{4} q\ell - \frac{q s}{2} \\ M(s) = \frac{\sqrt{2}}{4} q\ell s - \frac{q s^2}{4} \end{cases}$$

$M(\sqrt{2}\ell) = \frac{q\ell^2}{2} - q\ell^2$

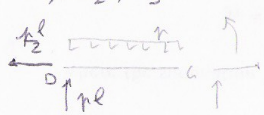
$M(\frac{\sqrt{2}}{2}\ell) = \frac{q\ell^2}{4} - \frac{q\ell^2}{8}$

Asta BC, $s \in [0, \ell]$



$$\begin{cases} N = 0 \\ T = -\frac{q\ell}{2} \\ M(s) = -\frac{q\ell s}{2} \end{cases}$$

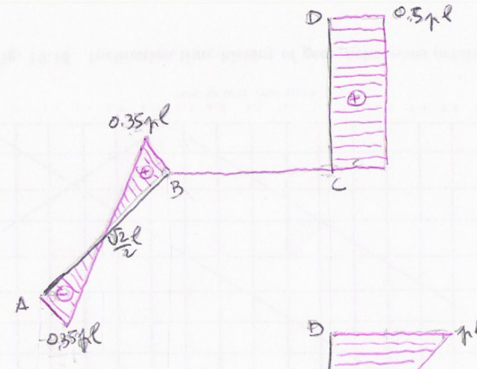
Asta DC, $s \in [0, \ell]$



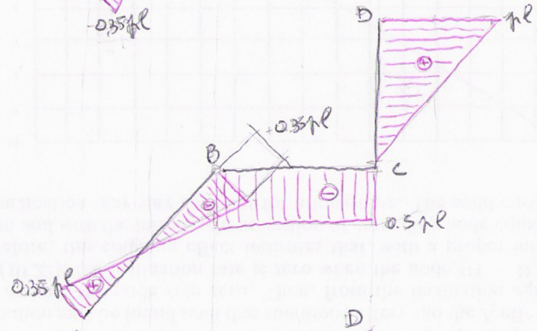
$$\begin{cases} N = \frac{q\ell}{2} \\ T(s) = q\ell - q s \\ M(s) = -\frac{q s^2}{2} + q\ell s \end{cases}$$

$M(\ell) = \frac{q\ell^2}{2}$

N



T



M