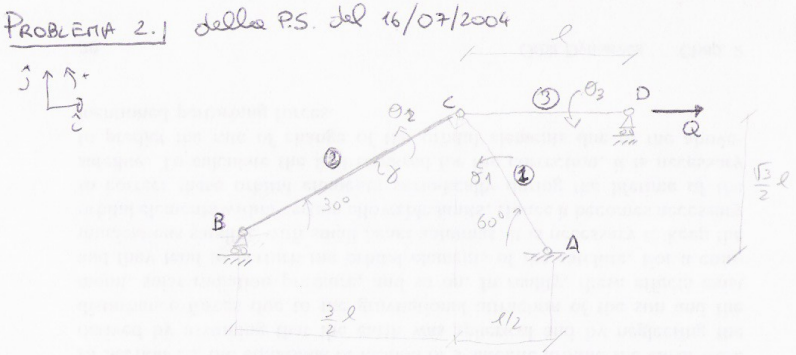
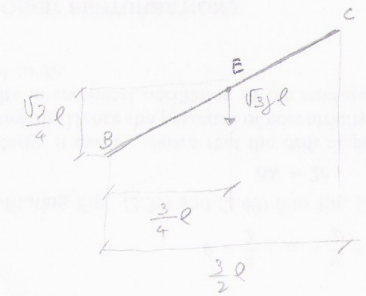
PROBLEMA 2.1 della P.S. del 16/07/2004





COND. VINCOLI

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

$$\bullet\ \underline{u}_C = \underline{u}_A + \theta_1 \hat{k} \wedge \overrightarrow{AC} = -\frac{\sqrt{3}}{2}\ell\theta_1 \hat{i} - \frac{\ell}{2}\theta_1 \hat{j}$$

$$\underline{u}_B = \underline{u}_C + \theta_2 \hat{k} \wedge \overrightarrow{CB} = \frac{\sqrt{3}}{2}\ell\theta_2 \hat{i} - \frac{3}{2}\ell\theta_2 \hat{j}$$
$$+ -\frac{\sqrt{3}}{2}\ell\theta_1 \hat{i} - \frac{\ell}{2}\theta_1 \hat{j}$$

$$\underline{u}_B = \frac{\sqrt{3}}{2}\ell(\theta_2 - \theta_1)\hat{i} - \frac{\ell}{2}(3\theta_2 + \theta_1)\hat{j}$$

$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 0 & \theta_3 \\ +\ell & 0 & 0 \end{vmatrix}$$

Mq x la cond. vinc.

$$\underline{u}_B \cdot \hat{j} = 0 \Rightarrow -\frac{\ell}{2}(3\theta_2 + \theta_1) = 0$$

$$\Rightarrow \boxed{\theta_2 = -\frac{\theta_1}{3}}$$

$$\Rightarrow \bullet\ \underline{u}_B \equiv \left(-2\frac{\sqrt{3}}{3}\ell\theta_1 ; 0\right)$$

$$\underline{u}_D = \underline{u}_C + \theta_3 \hat{k} \wedge \overrightarrow{CD} =$$
$$= -\frac{\sqrt{3}}{2}\ell\theta_1 \hat{i} + \left(-\frac{\ell}{2}\theta_1 + \ell\theta_3\right)\hat{j}$$

$$\underline{u}_D \cdot \hat{j} = 0 \Rightarrow -\frac{\ell}{2}\theta_1 + \ell\theta_3 = 0 \Rightarrow \boxed{\theta_3 = \frac{\theta_1}{2}}$$

Il peso totale dell'asta BC:

$$\gamma \frac{\sqrt{3}}{2} 2\ell = \sqrt{3}\gamma\ell$$

è il peso applicato nel punto E ?

Di quanto si sposta il punto E? (mi interessa solo la componente verticale)

$$u_{Ej} = \frac{u_{Cj} - u_{Bj}}{2} = -\frac{\ell}{4}\theta_1$$

Dal TLV:

$$\left(-\sqrt{3}\gamma\ell\right)\left(-\frac{\ell}{4}\theta_1\right) + \left(-\frac{\sqrt{3}}{2}\ell\theta_1\right) Q = 0$$

$$\boxed{Q = \frac{\gamma\ell}{2}}$$