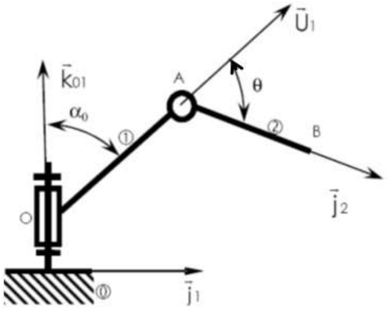
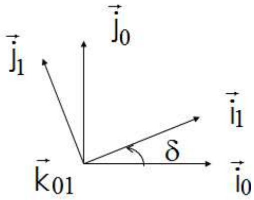
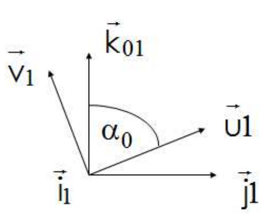
APPLICATIONS DIRECTES

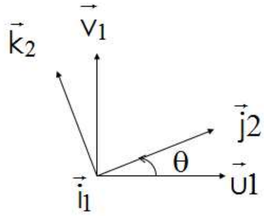
1. <u>Calcul d'énergie cinétique</u>

Cas 3 : robot vraiment moins simple …









Solide 1 : $\left[I(O,S_1)\right]_{\vec{i}_1,\vec{u}1,\vec{v}1} = m_1\dfrac{l_1^2}{3}\begin{bmatrix}1&0&0\\0&0&0\\0&0&1\end{bmatrix}_{\vec{i}_1,\vec{u}1,\vec{v}1}$ $\qquad \vec{\Omega}_{1/0} = \omega_{10}\left(\cos\alpha_0.\vec{u}_1 + \sin\alpha_0.\vec{v}_1\right)$

Torseur cinématique 1/0 en O : $\begin{Bmatrix}\vec{\Omega}_{1/0} = \omega_{10}.\vec{k}_{01}\\ \vec{V}_{O\in 1/0} = \vec{0}\end{Bmatrix}_O$

Torseur cinétique 1/0 en O : $\begin{Bmatrix} m_1\vec{V}_{G1\in 1/0} = -m_1\dfrac{l_1}{2}.\sin\alpha_0.\omega_{10}.\vec{i}_1 \\ \vec{\sigma}_{O\in 1/0} = \omega_{10}.m_1\dfrac{l_1^2}{3}\sin\alpha_0\vec{v_1}\end{Bmatrix}_O$ $\qquad \rightarrow 2T(S1/R) = \dfrac{m_1 l_1^2\omega_{10}^2(\sin\alpha_0)^2}{3}$

Solide 2 : $\left[I(G_2,S_2)\right]_{\vec{i}_1,\vec{j}2,\vec{k}2} = m_2\dfrac{l_2^2}{12}\begin{bmatrix}1&0&0\\0&0&0\\0&0&1\end{bmatrix}_{\vec{i}_1,\vec{j}2,\vec{k}2}$ $\qquad \vec{\Omega}_{2/0} = \begin{pmatrix}\dot{\theta}\\ \omega_{10}\cos(\alpha_0-\theta)\\ \omega_{10}\sin(\alpha_0-\theta)\end{pmatrix}_{base_{\vec{i}_1,\vec{j}2,\vec{k}2}}$

Torseur cinématique 2/0 en G2 : $\begin{Bmatrix}\vec{\Omega}_{2/0} = \omega_{01}.\vec{k}_{01} + \dot{\theta}\vec{i}_1\\ \left(-\omega_{10}\left(l_1.\sin\alpha_0\right)\vec{i}_1 - \omega_{10}\left(\dfrac{l_2}{2}.\sin\left(\alpha_0-\theta\right)\right)\vec{i}_1 + \dfrac{l_2}{2}\dot{\theta}\vec{k}_2\right)\end{Bmatrix}_{G_2}$

Torseur cinétique 2/0 en G2 : $\begin{Bmatrix} m_2\left(-\omega_{10}\left(l_1.\sin\alpha_0\right)\vec{i}_1 - \omega_{10}\left(\dfrac{l_2}{2}.\sin\left(\alpha_0-\theta\right)\right)\vec{i}_1 + \dfrac{l_2}{2}\dot{\theta}\vec{k}_2\right)\\ \vec{\sigma}_{G_2\in 2/0} = m_2\dfrac{l_2^2}{12}\dot{\theta}\vec{i}_1 + m_2\dfrac{l_2^2}{12}\omega_{10}\sin(\alpha_0-\theta)\vec{k}_2\end{Bmatrix}_{G_2}$

$$\rightarrow \begin{aligned} 2T(S2/R) &= m_2\frac{l_2^2}{12}\dot{\theta}^2 + m_2\frac{l_2^2}{12}\omega_{10}^2\sin(\alpha_0-\theta)^2 + \\ &m_2\left(\omega_{10}\left(l_1.\sin\alpha_0\right) + \omega_{10}\left(\frac{l_1}{2}.\sin\left(\alpha_0-\theta\right)\right)\right)^2 + m_2\left(\frac{l_2}{2}\dot{\theta}\right)^2\end{aligned}$$