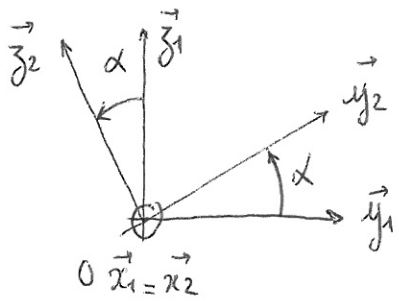
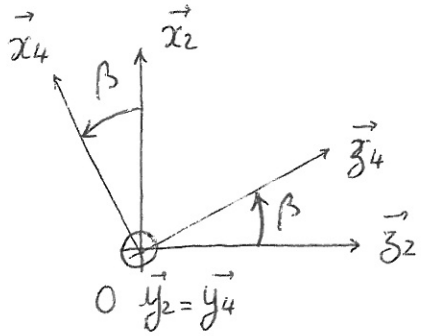
Mélangeur de peinture - corrigé





Question 1

Torseur cinématique de 2/1 en O $\quad \{V(2/1)\} = \left\{ \begin{matrix} \vec{\Omega}_{2/1} \\ \vec{V}_{O,2/1} \end{matrix} \right\}_O$

Nature du mouvement de 2/1 : rotation d'axe $O\vec{x}_1$ (α)

$$\Rightarrow \vec{\Omega}_{2/1} = \dot{\alpha}\,\vec{x}_1$$
$$\vec{V}_{O,2/1} = \vec{0}$$

Question 2

Torseur cinématique de 4/1 en O et en G $\quad \{V_{4/1}\} = \left\{ \begin{matrix} \vec{\Omega}_{4/1} \\ \vec{V}_{O,4/1} \end{matrix} \right\}_O$

Nature du mouvement de 4/1 : rotation d'axe $O\vec{y}_2$ + rotation d'axe $O\vec{x}_1$

$$\vec{\Omega}_{4/1} = \dot{\alpha}\,\vec{x}_1 + \dot{\beta}\,\vec{y}_2$$
$$\vec{V}_{O,4/1} = \vec{0}$$

$\vec{V}_{G,2/1}$?

Meth 1 : calcul direct $\quad \vec{V}_{G,4/1} = \left.\frac{d\vec{OG}}{dt}\right|_1 = \left.\frac{d}{dt}\, x_G\, \vec{x}_4\right|_1$

$$\left.\frac{d\vec{x}_4}{dt}\right|_1 = \vec{\Omega}_{4/1} \wedge \vec{x}_4 = \dot{\alpha}\sin\beta\,\vec{y}_2 + (-\dot{\beta})\,\vec{z}_4$$

$$\vec{V}_{G,2/1} = x_G\,(\dot{\alpha}\sin\beta\,\vec{y}_2 - \dot{\beta}\,\vec{z}_4)$$

Meth 2 champ des vitesses

$$\vec{V}_{G,2/1} = \vec{V}_{O,4/1} + (\vec{\Omega}_{4/1} \wedge \vec{OG})$$
$$= \vec{0} + (\dot{\alpha}\,\vec{x}_1 + \dot{\beta}\,\vec{y}_2) \wedge x_G\,\vec{x}_4$$
$$= x_G \left\{ \dot{\alpha} \sin\beta\,\vec{y}_2 - \dot{\beta}\,\vec{z}_4 \right\}$$

Meth 3 composition des vitesses $\vec{V}_{G,4/1} = \vec{V}_{G,4/2} + \vec{V}_{G,2/1}$

$\vec{\Omega}_{4/2} \wedge \vec{OG}$ $\quad$ $\vec{\Omega}_{2/1} \wedge \vec{OG}$

$\dot{\beta}\,\vec{y}_2 \wedge x_G\,\vec{x}_4$ $\quad$ $\dot{\alpha}\,\vec{x}_2 \wedge x_G\,\vec{x}_4$