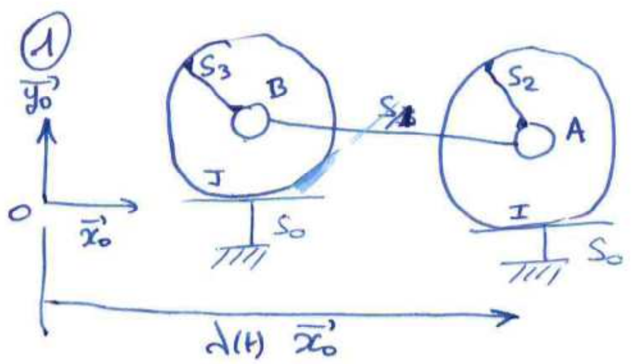
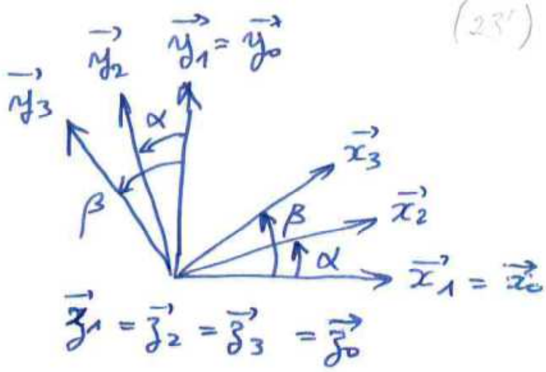
AP7

10h42 (23')

①





② Roulement sans glissement en I $\boxed{\vec V_{I,2/0} = \vec 0}$

③ (Composition des vitesses $\vec V_{I,2/1} + \vec V_{I,1/0} = \vec 0$)
utile à la question 4

Varignon $\vec V_{A,2/0} = \underbrace{\vec V_{I,2/0}}_{\vec 0} + \vec{AI} \wedge \vec\Omega_{2/0}$

$= -R\vec y_0 \wedge \dot\alpha \vec z_0$

$$\boxed{\vec V_{A,2/0} = -R\dot\alpha\,\vec x_0}$$

④ Composition des vitesses $\vec V_{I,2/1} - \vec V_{I,1/0} = \vec 0$

1/0 : translation rectiligne $\rightarrow \vec V_{I,1/0} = \vec V_{A,1/0}$ $(\vec\Omega_{1/0} = \vec 0)$

$\vec V_{I,1/0} = \dot\lambda\,\vec x_0$ $\left(\left[\frac{d\vec{OA}}{dt}\right]_0\right)$

2/1 : rotation d'axe $(A, \vec z_0) \rightarrow \vec V_{I,2/1} = \underbrace{\vec V_{A,2/1}}_{\vec 0} + \vec{IA} \wedge \vec\Omega_{2/1}$

$\vec V_{I,2/1} = R\vec y_0 \wedge \dot\alpha\vec z_0 = R\dot\alpha\,\vec x_0$

$\Rightarrow +\dot\lambda\,\vec x_0 + R\dot\alpha\,\vec x_0 = \vec 0$ soit $\boxed{\dot\lambda = -R\dot\alpha}$

Plus rapidement la composition des vitesses en A donnait
$\vec V_{A,2/0} = \underbrace{\vec V_{A,2/1}}_{\vec 0} + \vec V_{A,1/0}$ soit $-R\dot\alpha\,\vec x_0 = \dot\lambda\,\vec x_0$

11h00 ⑤ $k = \frac{\omega_{roue}}{\omega_{cyl}} \rightarrow \omega_{cyl} = \frac{\omega_{roue}}{k} = \frac{|\dot\alpha|}{k} = \frac{\dot\lambda}{kR}$ $\boxed{\omega_{cyl} = \frac{V}{kR}}$

11h05 $\omega_{cyl} = \frac{50/3,6}{51/14 \cdot 0,35} = 10,9$ rad/s $\rightarrow N_{cyl} = \frac{60}{2\pi}\omega_{cyl} = 104$ tr/min $> N_{max}$

11h05

① $\vec{V}_{A,2/0} = \left[\dfrac{d\,\vec{OA}}{dt}\right]_0 = \left[\dfrac{d\,y(t)\,\vec{y}}{dt}\right]_0 = \dot{y}(t)\ \vec{y} + y(t)\underbrace{\cancel{\left[\dfrac{d\vec{y}}{dt}\right]_0}}_{\vec{0}}$

$$\boxed{\vec{V}_{A,2/0} = \dot{y}(t)\,.\,\vec{y}}$$

Varignon : $\vec{V}_{I,2/0} = \vec{V}_{A,2/0} + \vec{IA} \wedge \underbrace{\cancel{\vec{\Omega}_{2/0}}}_{\vec{0}}$ 2/0 : translat

$$\boxed{\vec{V}_{I,2/0} = \dot{y}(t)\,\vec{y}}$$

② $\boxed{\vec{V}_{O,1/0} = \vec{0}}$ car O est le centre la pivot entre 1 et 0.

Varignon : $\vec{V}_{I,1/0} = \underbrace{\cancel{\vec{V}_{O,1/0}}}_{\vec{0}} + \vec{IO} \wedge \vec{\Omega}_{1/0}$

$= -\left(\vec{OC} + \vec{CI}\right) \wedge \vec{\Omega}_{1/0}$

$\vec{V}_{I,1/0} = -\left(e\,\vec{x}_1 + R\,\vec{y}\right) \wedge \dot{\theta}\,\vec{z}$

On $\begin{cases} \vec{x}_1 \wedge \vec{z} = -\vec{y}_1 & \text{(sens positif } \vec{x}_1 \to \vec{y}_1 \to \vec{z}_1 \to \vec{x}_1\text{)} \\ \vec{y} \wedge \vec{z} = \vec{x} \end{cases}$

d'où $\boxed{\vec{V}_{I,1/0} = e\,\dot{\theta}\,\vec{y}_1 - R\,\dot{\theta}\,\vec{x}}$

③ Vecteur vitesse de glissement (ici entre 1 et 2) : $\boxed{\vec{V}_{I,2/1}}$

④ Composition des vitesses : $\vec{V}_{I,2/1} = \vec{V}_{I,2/0} - \vec{V}_{I,1/0}$

d'après les résultats du 1) et 2) :

$$\boxed{\vec{V}_{I,2/1} = \dot{y}(t)\,\vec{y} - e\,\dot{\theta}\,\vec{y}_1 + R\dot{\theta}\,\vec{x}}$$

11h13

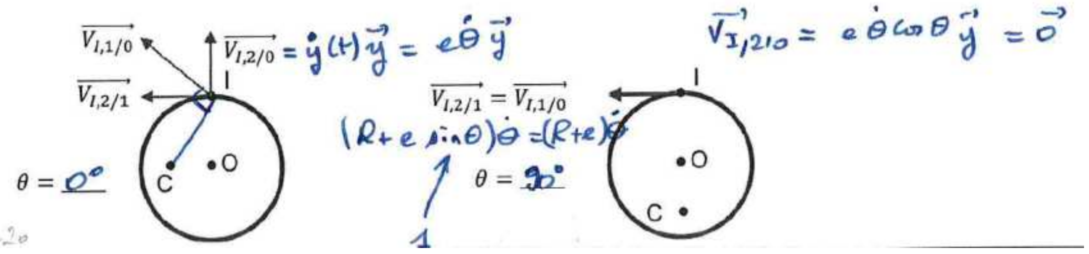
⑤ Non décollement $\vec{V}_{I,2/1}\,.\,\vec{y} = \vec{0}$

$\Rightarrow \dot{y}(t) - e\,\dot{\theta}\cos\theta = 0$ soit $\boxed{\dot{y}(t) = e\,\dot{\theta}\cos\theta}$

⑥ $V_{I,2/1} = \vec{V}_{I,2/1}\,.\,\vec{x} = \dot{y}(t)\,.\,0 - e\dot{\theta}\,(-\sin\theta) + R\dot{\theta}$

$$\boxed{V_{I,2/1} = \left(R + e\sin\theta\right)\dot{\theta}}$$

11h16



11h20