$$\left\{ D_{E/0} \right\} = \left\{ D_{1/0} \right\} + \left\{ D_{2/0} \right\} \qquad E = \{1+2\}$$

Avec $\left\{ D_{1/0} \right\} = \left\{ \begin{array}{l} \vec{R}_{d,1/0} = m_1 . \vec{\Gamma}_{G_1,1/0} \\ \vec{\delta}_{G_2,1/0} = m_1 \vec{V}_{G_2/0} \wedge \vec{V}_{G_1,1/0} + \left[\dfrac{d\vec{\sigma}_{G_2,1/0}}{dt} \right]_0 \end{array} \right\}_A$

avec $\vec{\Gamma}_{G_1,1/0} = \ddot{x} . \vec{x_0}$ car 1/0 est une translation

$$\vec{V}_{G_2/0} = \left[\frac{d\vec{OG_2}}{dt} \right]_0 = \left[\frac{d\vec{OA}}{dt} \right]_0 + \left[\frac{d\vec{AG_2}}{dt} \right]_0$$

$$= \dot{x} . \vec{x_0} + c . \left[\frac{d\vec{x_2}}{dt} \right]_0$$

$$= \dot{x} . \vec{x_0} + c\, \vec{\Omega}_{2/0} \wedge \vec{x_2}$$

$$= \dot{x} . \vec{x_0} + c . \dot{\alpha}\, \vec{z_2} \wedge \vec{x_2}$$

$$= \dot{x} . \vec{x_0} + c . \dot{\alpha}\, \vec{y_2}$$

$$\vec{\sigma}_{G_2,1/0} = m_1 . \vec{G_2G_1} \wedge \vec{V}_{G_2,1/0} + \underbrace{I(G_2,1) . \vec{\Omega}_{1/0}}_{\vec{0} \text{ car } 1/0 \text{ translation}}$$

$\vec{V}_{G_2,1/0} = \dot{x} . \vec{x_0}$ car on pose $\alpha = cste$

⚠ Erreur (ou manquement) au sujet :

→ soit on définit $G_1 = A$ (abusif !)

→ soit on pose $\overrightarrow{AG_1} = -d.\vec{x_0} - f.\vec{y_0}$

$$\overrightarrow{\sigma_{G_2,1/0}} = m_1 \left(\overrightarrow{G_2A} + \overrightarrow{AG_1}\right) \wedge \overrightarrow{V_{G_2,1/0}}$$

$$= m_1 \left(c.\vec{x_2} - d\,\vec{x_0} - f.\vec{y_0}\right) \wedge \dot{x}.\vec{x_0}$$

$$= m_1 \left(c\left(\cos\alpha.\vec{x_0} + \sin\alpha.\vec{y_0}\right) - d\,\vec{x_0} - f\vec{y_0}\right) \wedge \dot{x}.\vec{x_0}$$

$$= \left(m_1.c.\sin\alpha - m_1 f\right)\dot{x}.\vec{y_0} \wedge \vec{x_0}$$

$$= m_1.\dot{x}\left(f - c.\sin\alpha\right).\vec{z_0}$$

$$\left[\frac{d\overrightarrow{\sigma_{G_2,1/0}}}{dt}\right]_0 = \ddot{x}.m_1.\left(f - c.\sin\alpha\right).\vec{z_0}$$

$$+ m_1.\dot{x}\left(-c.\dot{\alpha}.\cos\alpha\right)\vec{z_0}$$

$$\overrightarrow{\delta_{G_2,1/0}} = m_1.\left(\dot{x}.\vec{x_0} + \dot{\alpha}c.\vec{y_2}\right) \wedge \dot{x}.\vec{x_0} + \left[\frac{d\overrightarrow{\sigma_{G_2,1/0}}}{dt}\right]_0$$

$$= m_1\dot{\alpha}.c.\dot{x}\,\underbrace{\left(\vec{y_2} \wedge \vec{x_0}\right)}_{} + \left[\frac{d\overrightarrow{\sigma_{G_2,1/0}}}{dt}\right]_0$$

$$\left(\cos\alpha\,\vec{y_0} - \sin\alpha.\vec{x_0}\right) \wedge \vec{x_0} = -\cos\alpha.\vec{z_0}$$

donc

$$\left\{\mathcal{D}_{1/0}\right\} = \left\{\begin{array}{l} \overrightarrow{R_{d,1/0}} = m_1 \cdot \ddot{x} \cdot \overrightarrow{x_0} \\ \overrightarrow{\delta_{G_2,1/0}} = -m_1 \cdot \cos\alpha \cdot \dot{\alpha} \cdot \dot{x}\, \overrightarrow{z_0} \cdot c \\ \qquad + m_1 \cdot \ddot{x} \left(\ell - c \cdot \sin\alpha\right) \overrightarrow{z_0} \\ \qquad - c \cdot m_1 \cdot \dot{x} \cdot \dot{\alpha} \cos\alpha \cdot \overrightarrow{z_0} \\ \qquad = \left(-2 \cdot c \cdot m_1 \cdot \dot{x} \cdot \dot{\alpha} \cdot \cos\alpha + m_1 \cdot \ddot{x}(\ell - c\sin\alpha)\right) \overrightarrow{z_0} \end{array}\right\}_{G_2}$$

Pour $\left\{\mathcal{D}_{2/0}\right\}$:

$$\left\{\mathcal{D}_{2/0}\right\} = \left\{\begin{array}{l} \overrightarrow{R_{d,2/0}} = m_2 \cdot \overrightarrow{\Gamma_{G_2,2/0}} \\ \overrightarrow{\delta_{G_2,2/0}} = m_2 \cdot \underbrace{\overrightarrow{V_{G_2/0}} \wedge \overrightarrow{V_{G_2,2/0}}}_{\vec{0}} + \left[\dfrac{d\overrightarrow{\sigma_{G_2,2/0}}}{dt}\right]_0 \end{array}\right\}_{G_2}$$

$$\text{or } \overrightarrow{\sigma_{G_2,2/0}} = m_2 \cdot \underbrace{\overrightarrow{G_2G_2}}_{\vec{0}} \wedge \overrightarrow{V_{G_2,2/0}} + I(G_2,2)\, \overrightarrow{\Omega_{2/0}}$$

or $\overrightarrow{AG_2} = c \cdot \overrightarrow{x_2}$

$$I(G_2,2) = I(A,2) - m_2 \begin{bmatrix} 0 & 0 & 0 \\ 0 & c^2 & 0 \\ 0 & 0 & c^2 \end{bmatrix}_{b_2}$$

$$= \begin{bmatrix} I_{Ax} & 0 & 0 \\ 0 & I_{Ay} - m_2 c^2 & 0 \\ 0 & 0 & I_{Az} - m_2 \cdot c^2 \end{bmatrix}_{b_2}$$

$$\vec{\sigma}_{G_2,2/0} = I(G_2,2) \cdot \vec{\Omega}_{2/0}$$

$$= \begin{bmatrix} I_{Ax} & 0 & 0 \\ 0 & I_{Ay} - m_2 \cdot c^2 & 0 \\ 0 & 0 & I_{Az} - m_2 \cdot c^2 \end{bmatrix}_{b_2} \begin{pmatrix} 0 \\ 0 \\ \dot{\alpha} \end{pmatrix}_{b_2}$$

$$= (I_{Az} - m_2 \cdot c^2)\,\dot{\alpha} \cdot \vec{z}_2$$

$$\vec{\delta}_{G_2,2/0} = \left[\frac{d(\vec{\sigma}_{G_2,2/0})}{dt}\right]_0$$

$$= \overbrace{\cancel{(I_{Az} - m_2 c^2)\,\ddot{\alpha}}}^{\vec{0} \text{ car } \dot{\alpha} = \text{cste}} \cdot \vec{z}_2 + (I_{Az} - m_2 \cdot c^2)\,\dot{\alpha} \left[\frac{d\vec{z}_2}{dt}\right]_0$$

$$= (I_{Az} - m_2 \cdot c^2)\,\dot{\alpha}^2\, \vec{z}_2 \wedge \vec{z}_2$$

$$= \vec{0}$$

$$\left\{ \mathbb{D}_{2/0} \right\} = \left\{ \begin{matrix} \vec{R}_{d2/0} = m_2 \cdot \vec{\Gamma}_{G_2,2/0} \\ \vec{\delta}_{G_2,2/0} = \vec{0} \end{matrix} \right\}_{G_2}$$

$$\left\{ \mathbb{D}_{E/0} \right\} = \left\{ \begin{matrix} \vec{R}_{d1/0} + \vec{R}_{d2/0} \\ \vec{\delta}_{G_2,1/0} + \vec{\delta}_{G_2,2/0} \end{matrix} \right\}_{G_2}$$