

TD th: Méca (Psi)

PARTIE 3: Modélisation & Analyse commande hor

phase de balancement.

On veut
$$\begin{cases} \vec{V}_{HE3/0} \cdot \vec{y}_0 = 0 \\ \vec{V}_{HE3/0} \cdot \vec{x}_0 = V : \text{vitesse de déplacement du patient} \end{cases}$$

$\Rightarrow$ DOCUMENT 4 - $\vec{\Omega}_{2/1} = \omega(t) \vec{z}_0$

11) $\vec{V}_{HE3/2} = \dot{l} \vec{y}_{3m2}$

12) $\vec{V}_{HE2/0} = \underbrace{\vec{V}_{AE1/0}}_{R(-\dot{\theta} + \omega) \vec{x}_0} - l \dot{\theta} \vec{x}_2 \quad \left\{ \begin{array}{l} \vec{\Omega}_{1/0} = \vec{\Omega}_{1/2} + \vec{\Omega}_{2/0} \\ \vec{\Omega}_{2/0} = \dot{\theta} \vec{z}_0 \end{array} \right.$

13) $\Rightarrow \vec{V}_{HE3/0} = R(\omega - \dot{\theta}) \vec{x}_0 - l \dot{\theta} \vec{x}_2 + \dot{l} \vec{y}_2$

14) $\Rightarrow \omega = ?$

$$\vec{V}_{HE3/0} = \underbrace{\left[R(\omega - \dot{\theta}) - l \dot{\theta} \cos \theta - \dot{l} \sin \theta \right]}_V \vec{x}_0 + \underbrace{\left[-l \dot{\theta} \sin \theta + \dot{l} \cos \theta \right]}_0 \vec{y}_0$$

$\Rightarrow \omega = \frac{V + l \dot{\theta} \cos \theta - \dot{l} \sin \theta}{R} + \dot{\theta} \quad \Delta \quad \dot{l}$

$\dot{l} = \frac{l \dot{\theta} \sin \theta}{\cos \theta} = l \dot{\theta} \tan \theta$

Soit
$$\omega = \frac{V + l \dot{\theta} \cos \theta - l \dot{\theta} \tan \theta}{R} + \dot{\theta}$$

15) $\omega_{nominal} = 11 \text{ rad/s}$

Moteur robe: Vitesse nominale = 3260 tr/min

$= 3260 \times \frac{2\pi}{60}$

$= 341 \text{ rad/s}$

$\frac{341}{11} = 31$

$$16) R_1 = \frac{\omega_{R12}}{\omega_{mR12}} = ?$$

Train épi $\Rightarrow$ Formule de Willis :

$$\frac{\omega_{p2} - \omega_{ps}}{\omega_{p1} - \omega_{ps}} = - \frac{Z_{p1}}{Z_{p2}}$$

$$\frac{\omega_{ps}}{\omega_{p1} - \omega_{ps}} = \frac{Z_{p1}}{Z_{p2}}$$

$$\omega_{ps} Z_{p2} = \omega_{p1} Z_{p1} - \omega_{ps} Z_{p1}$$

$$\omega_{ps} (Z_{p2} + Z_{p1}) = \omega_{p1} Z_{p1}$$

$$\omega_{ps} = \frac{Z_{p1}}{Z_{p2} + Z_{p1}} \omega_{p1}$$

$$\frac{18}{82 + 18} = \frac{18}{100} \simeq \frac{1}{5,55} = R_1$$

$$\text{Si } n \text{ étages } \Rightarrow r = \frac{1}{5,55^n} \quad 5,55^2 = 30,8$$

$$\Rightarrow \underline{n=2}$$