① $\{\tau_{sol/roue}\}_A = \begin{Bmatrix} R_{sol/roue}\sin\psi & 0 \\ R_{sol/roue}\cos\psi & 0 \\ 0 & C_r \end{Bmatrix}_A$

/3

$\{\tau_{pes/roue}\}_G = \begin{Bmatrix} -P\sin\psi & 0 \\ -P\cos\psi & 0 \\ 0 & 0 \end{Bmatrix}_G$

$\{\tau_{arbre/roue}\}_G = \begin{Bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & -C_{roue} \end{Bmatrix}$

② $\{\tau_{pes/sol}\}_A = \begin{Bmatrix} -P\sin\psi \\ -P\cos\psi \\ 0 \end{Bmatrix}$ (L, N, H) $\rightarrow \vec{M} = \vec{AG} \wedge \begin{pmatrix} -P\sin\psi \\ -P\cos\psi \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ R \\ 0 \end{pmatrix} \wedge \begin{pmatrix} -P\sin\psi \\ -P\cos\psi \\ 0 \end{pmatrix}$

$\Rightarrow \{\tau_{pes/roue}\}_A = \begin{Bmatrix} -P\sin\psi & 0 \\ -P\cos\psi & 0 \\ 0 & RP\sin\psi \end{Bmatrix}_A$ /1

$\{\tau_{arbre/roue}\}_A = \begin{Bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & -C_{roue} \end{Bmatrix}_A$ (L, N, H) $\rightarrow \vec{M} = \begin{pmatrix} 0 \\ 0 \\ -C_{roue} \end{pmatrix} + \vec{AG} \wedge \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} = \vec{0}$

$\Rightarrow \{\tau_{arbre/roue}\}_A = \begin{Bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & -C_{roue} \end{Bmatrix}_A$ /1

/1 PFD : $C_r - C_{roue} + RP\sin\psi = 0 \Rightarrow \boxed{C_{roue} = C_r + mgR\sin\psi}$

③ TMD au point A : $\mathcal{M}_A(\overrightarrow{R_{sol/roue}}) + \mathcal{M}_A(\overrightarrow{F_p/s}) + \vec{C_r} = \vec{0} \Rightarrow -R\frac{F_p}{8} + C_r = 0$ /1

/1 /2

$\Rightarrow \boxed{C_r = R F_p/8}$ AN : $\boxed{C_r = 0,24 \text{ N.m}}$