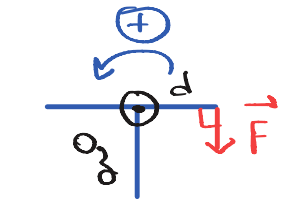
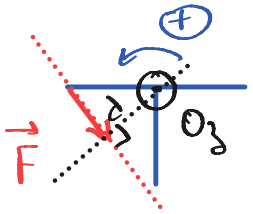
Chapitre 16

Application 1



$M_{oz} = -\|\vec{F}\| d$ $\quad d = 30\,cm$ $\quad \Gamma_{oz} = 30\ N.m^{-1}$



$\Gamma_{oz} = +\|\vec{F}\| d = 100 \times 0{,}3 \times \sin(60) = 26\ N.m^{-1}$

Application 2

1) $\vec{L}_o = \vec{OM} \wedge m\vec{v}(M) = \begin{vmatrix} r \\ 0 \\ z=0 \end{vmatrix} \wedge \begin{vmatrix} m\dot{r} = 0 \\ mr\dot{\theta} \\ m\dot{z} = 0 \end{vmatrix}$ car $r = Cte$ car $z = 0 = Cte$

$\vec{L}_o = m r^2 \dot{\theta}\, \vec{u}_z$

2) BdF : . $\vec{R}_m$ $\quad \vec{OM}$ et $\vec{R}_m$ colinéaires $\rightarrow \vec{\Gamma}_o(\vec{R}_m) = \vec{0}$

. $m\vec{g}$ $\quad \vec{\Gamma}_o(m\vec{g}) = \begin{vmatrix} r \\ 0 \\ 0 \end{vmatrix} \wedge \begin{vmatrix} mg\sin\theta \\ mg\cos\theta \\ 0 \end{vmatrix} = \begin{vmatrix} 0 \\ 0 \\ mgr\cos\theta \end{vmatrix} = mgr\cos\theta\, \vec{u}_z$

bras de levier

. $\vec{F}$ $\quad \vec{\Gamma}(\vec{F}) = \begin{vmatrix} r \\ 0 \\ 0 \end{vmatrix} \wedge \begin{vmatrix} F\cos\theta \\ -F\sin\theta \\ 0 \end{vmatrix} = \begin{vmatrix} 0 \\ 0 \\ -Fr\sin\theta \end{vmatrix} = -Fr\sin\theta\, \vec{u}_z$

bras de levier

3) TMC $\Rightarrow mr^2\ddot{\theta} + Fr\sin\theta - mgr\cos\theta = 0$

$\ddot{\theta} + \frac{F}{mr}\sin\theta - \frac{g}{r}\cos\theta = 0$