

$$\beta > \alpha$$

Cone : $h = \text{altura}$

$R = \text{radio}$

$a = \frac{3}{4} h = \text{distancia v\'ertice}$
al C.M.

$$L = T - V$$

$$T = \frac{1}{2} M \vec{V}_{CM}^2 + \frac{1}{2} \vec{\omega} \cdot \vec{I}_{CM} \vec{\omega}$$

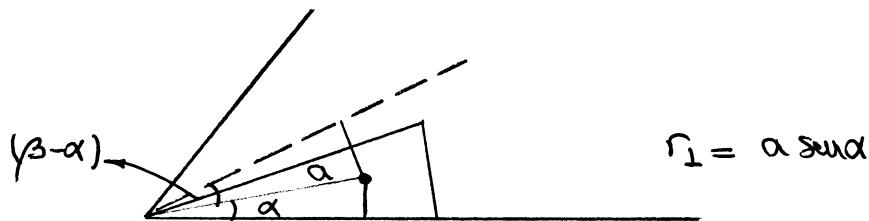
$$V = MgZ_{CM}$$

$$x_{CM} = a \sin(\beta - \alpha) \cos\theta$$

$$y_{CM} = a \sin(\beta - \alpha) \sin\theta$$

$$z_{CM} = a \cos(\beta - \alpha)$$

$$|\vec{V}_{CM}| = |\vec{\omega} \times \vec{r}| = \omega r_{\perp} = \omega a \sin\alpha$$

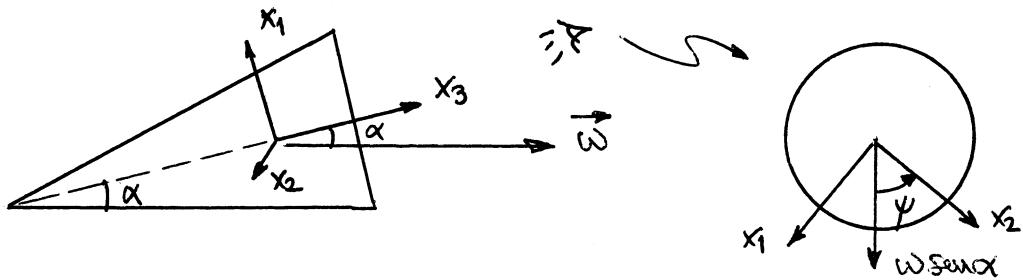


Por otra parte: $V_{CM} = a \sin(\beta - \alpha) \dot{\theta}$

Luego:

$$\omega a \sin\alpha = a \dot{\theta} \sin(\beta - \alpha)$$

$$\omega = \dot{\theta} \frac{\sin(\beta - \alpha)}{\sin\alpha}$$



$$\omega_3 = \omega \cos \alpha = \dot{\theta} \operatorname{ctg} \alpha \sin(\beta - \alpha)$$

$$\omega_1 = \omega \sin \alpha \sin \psi = \dot{\theta} \sin(\beta - \alpha) \sin \psi$$

$$\omega_2 = \omega \sin \alpha \cos \psi = \dot{\theta} \sin(\beta - \alpha) \cos \psi$$

$$\begin{aligned} \frac{1}{2} \vec{\omega} \vec{\omega} &= \frac{1}{2} (I_1 \omega_1^2 + I_2 \omega_2^2 + I_3 \omega_3^2) = \\ &= \frac{1}{2} I_1 (\omega_1^2 + \omega_2^2) + \frac{1}{2} I_3 \omega_3^2 = \\ &= \frac{1}{2} I_1 \omega^2 \sin^2 \alpha + \frac{1}{2} I_3 \omega^2 \cos^2 \alpha = \\ &= \frac{1}{2} I_1 \dot{\theta}^2 \sin^2(\beta - \alpha) + \frac{1}{2} I_3 \dot{\theta}^2 \operatorname{ctg}^2 \alpha \sin^2(\beta - \alpha) \end{aligned}$$

Frage:

$$\begin{aligned} T &= \frac{1}{2} M a^2 \sin^2(\beta - \alpha) \dot{\theta}^2 + \frac{1}{2} I_1 \dot{\theta}^2 \sin^2(\beta - \alpha) + \\ &\quad + \frac{1}{2} I_3 \dot{\theta}^2 \operatorname{ctg}^2 \alpha \sin^2(\beta - \alpha) \end{aligned}$$

$$V = M g a \cos(\beta - \alpha) = \text{cte.}$$

$$L = T - V$$

$$\frac{d}{dt} \left(\frac{\partial L}{\partial \dot{\theta}} \right) - \frac{\partial L}{\partial \theta} = 0$$