ORME118 - Chute d'un satellite (CMP-2017- Camille Maglovic)

1. * Th E_m : $d\left(\frac{1}{2}mv^2 - \frac{GmM_T}{r(t)}\right) = -\alpha \vec{v}\cdot\vec{dl}$

PFD : $-m\frac{v^2}{r(t)} = -\frac{GmM}{r^2} \longrightarrow mv^2 = \frac{GmM}{r}$

$\longrightarrow \quad -\frac{1}{2}GmM\, d\left(\frac{1}{r}\right) = -\alpha \vec{v}\,\vec{v}\,dt$

$= -\alpha v^2 dt = -\alpha\frac{GM}{r}dt$

$-\frac{1}{2}m\,r\,d\left(\frac{1}{r}\right) = -\alpha\, dt \longrightarrow \int\frac{1}{2}m\frac{1}{r}dr = \int-\alpha\, dt$

$\ln\left(\frac{r(t)}{r_0}\right) = -\frac{2\alpha}{m}t \longrightarrow \underline{r(t) = r_0 e^{-2\alpha t/m}}$

On pose $\tau = \frac{m}{2\alpha}$

* $f \ll f_{grav} \rightarrow \underline{\tau \gg T}$

2. $\ln\frac{(r_0-h)}{r_0} = -2\frac{\alpha}{m}t \longrightarrow \underline{\alpha = \frac{-m}{2t}\ln\left(1-\frac{h}{r_0}\right)}$

$\underline{\alpha = 1{,}4\ 10^{-5}\ kg\ s^{-1}}$