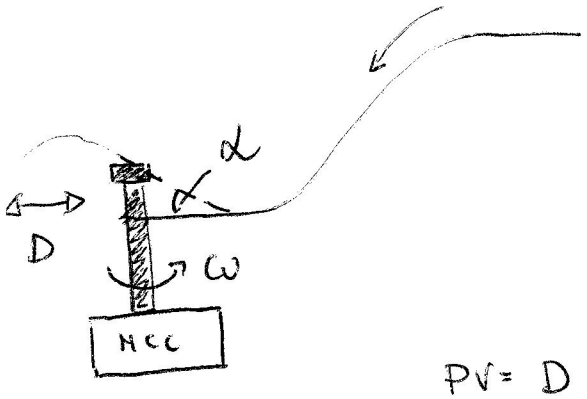
28th JANUARY 2011

SKY JUMPING

D = DISTANCE OF LANDING

α = INCLINATION TRAMPOLINE

ω = ANGULAR VELOCITY MOTOR



PARABOLIC MOTION $\Rightarrow$ $D = \frac{v_0^2 \sin(2\alpha)}{g}$ (gravitational acc.)

PV = D $V_M = \alpha, \vartheta, \omega_M, M$ $V_C = I$

$$G = \frac{D}{\alpha}, \frac{\alpha}{\vartheta} \cdot \frac{\vartheta}{\omega_M} \cdot \frac{\omega_M}{M_M} \cdot \frac{M_M}{I}$$

$$M = mg \sin\alpha\, b + \gamma_M K \dot{\alpha} + J_M K \ddot{\alpha}$$

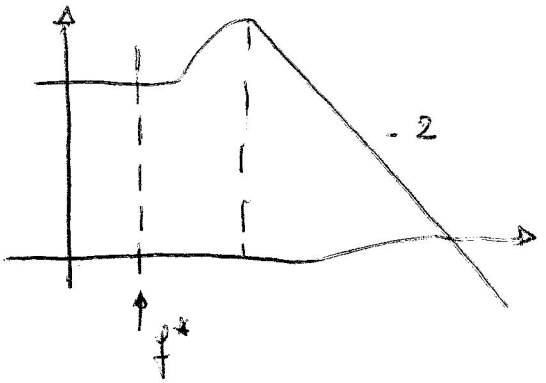
$\omega_M = K' s \vartheta$

$\alpha = K'' \vartheta$

$\omega_M = K \dot{\alpha}$ $\dot{\omega}_M = K \ddot{\alpha}$

$$\frac{\alpha}{M} = \frac{1}{mg\alpha + \gamma_M K s + J_M K s^2}$$

$$G = K_1 \cdot K'' \cdot \frac{1}{\gamma_M K' s + J_M K s^2 + mg}$$



- COMPLEX CONJUGATE POLES CANNOT BE COMPENSATED $\Rightarrow$ $Re \pm j\, Im$
- DAMPING DEPENDING ON $K\gamma_M$ CANNOT BE CONTROLLED $\Rightarrow$ RESONANCE
- BANDWIDTH UP TO f^* (WORK UP TO THE "DANGEROUS" AREA)

! NOT POSSIBLE TO CONSIDER $mg\alpha$ AS A DISTURBANCE (FF). IN THIS CASE M WOULD BE THE DISTURBANCE MULTIPLIED BY THE PV!

- TO DRIVE THE MOTOR $\Rightarrow$ TRIAC TO ASSURE BIDIRECTIONAL ROTATION
- MEASUREMENT: INCREMENTAL ENCODER (ALSO ABSOLUTE) LOCATED AT THE ANCHORAGE POINT OF THE TRAMPOLINE