PMR2352

19 de outubro de 2011

1 Ex 1

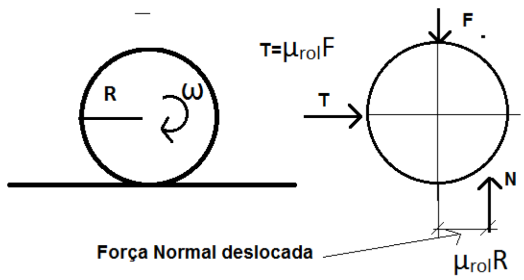

Figura 1: DCL

Exemplo

$$\mu_r R * \frac{\dot{x}}{|\dot{x}|}^1$$

TMB

$$m\ddot{x} = T - kx$$

$TMA)_{CENTRO}$

$$\frac{mR^2}{2}\ddot{\theta} = -T * R - \mu_r R \frac{\dot{x}}{|\dot{x}|}(mg)^2$$

$$\theta R = x$$

[1]ajuste de sinal
[2]Normal

$$\dot{\theta}R = \dot{x}$$
$$\ddot{\theta}R = \ddot{x}$$

$$m\ddot{x} = T - kx$$
$$\frac{m}{2}\ddot{x} = -T - \mu_{rol}\frac{\dot{x}}{|\dot{x}|}mg$$
$$\frac{3m}{2}\ddot{x} = -kx - \mu_{rol}\frac{\dot{x}}{|\dot{x}|}mg$$
$$\frac{3m}{2}\ddot{x} + kx + \mu_{rol}\frac{\dot{x}}{|\dot{x}|}mg = 0$$

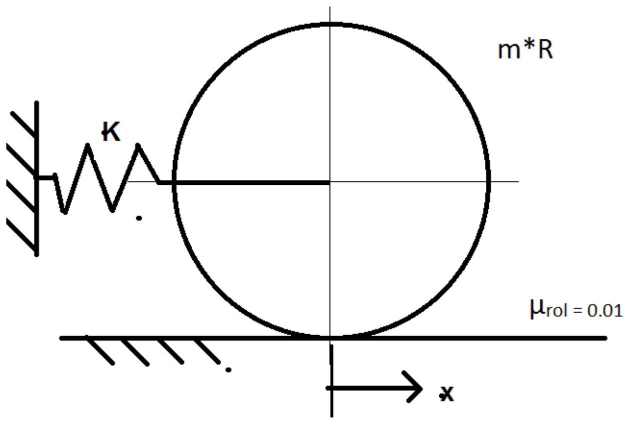

Figura 2: Exemplo

$$m_{eq}\ddot{x} + c_{eq}\dot{x} + k_{eq}x = 0$$

Para $\dot{x} > 0$

$$\frac{3m}{2}\ddot{x} + kx + \mu_{rol}mg = 0$$

Para $\dot{x} < 0$

$$\frac{3m}{2}\ddot{x} + kx - \mu_{rol}mg = 0$$

- $\dot{x}(0) = 0$

Para t>0, para t < T

$$(2a + b)\ddot{x} + 2gx = 0(t)$$

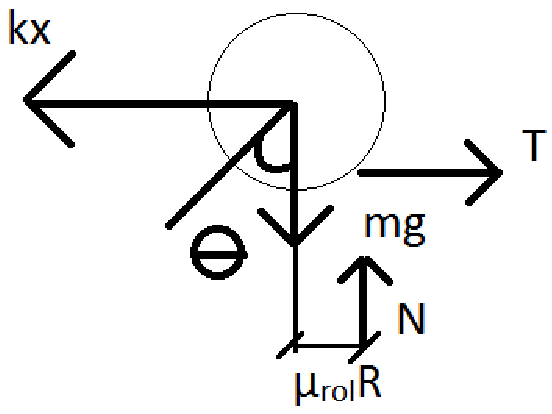

Figura 3: DCL exemplo

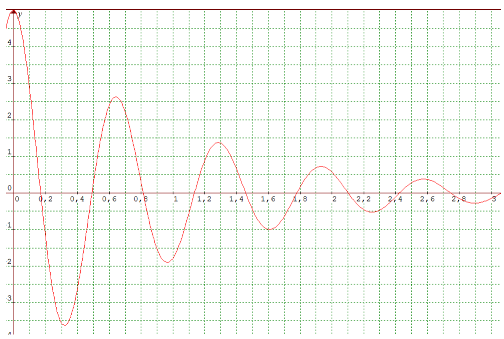

Figura 4: 2 ex1

2 Ex 2

$$2(\rho Aa)\ddot{x} + \rho Ab(\ddot{x} + \dot{v}(t)) = -2x\rho gA$$

$$(2a+b)\ddot{x} + 2gx = -b\dot{v}(t)$$
$$m_{eq}\ddot{x} + k_{eq}x = \psi(t)$$

$$\omega = \sqrt{\frac{2g}{2a+b}}$$

Para 0<t<T

$$(2a+b)\ddot{x} + 2gx = b\frac{V_0}{T}$$

Condiçeos iniciais:

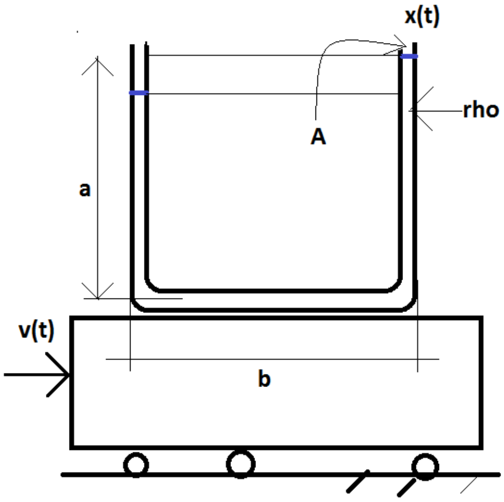

Figura 5: 1 Ex 2

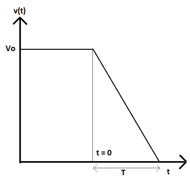

Figura 6: 2 Ex 2

- x(0)=0
- $\dot{x}(0) = 0$

Para t<0, para t > T

$$(2a + b)\ddot{x} + 2gx = 0(t)$$

$$x(t) = \frac{1}{m\omega} \int_0^t F(\tau) \sin(\omega(t - \tau)) d\tau$$

$$x_h(t) = A \sin(\omega t) + B \cos(\omega t)$$

$$x_p(t) = \frac{bV_0}{2gT}$$

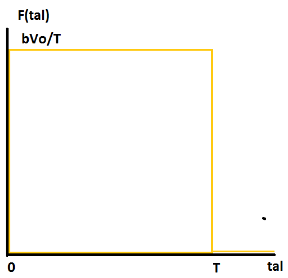

Figura 7: F de τ

$$x(t) = A\sin(\omega t) + B\cos(\omega t) + \frac{bV_0}{2gT}$$

$$\dot{x}(t) = A\omega\cos(\omega t) - B\sin(\omega t)$$

Condições Iniciais:

$$x(0) = 0 = B + \frac{bV_0}{2gT}$$

$$\dot{x}(0) = 0 = A\omega$$

Portanto

$$B = -\frac{-bV_0}{2gT}$$

$$A = 0$$

$$x(t) = \frac{bV_0}{2gT}(1 - \cos(\omega t))$$

$$\dot{x}(t) = \frac{bV_0}{2gT}\omega\sin(\omega t)$$

Para t=T:

$$x(T) = \frac{bV_0}{2gT}(1 - \cos(\omega t))$$

$$\dot{x}(T) = \frac{bV_0}{2gT}\omega\sin(\omega t)$$

Para t> T

$$(2a + b)\ddot{x} + 2gx = 0$$

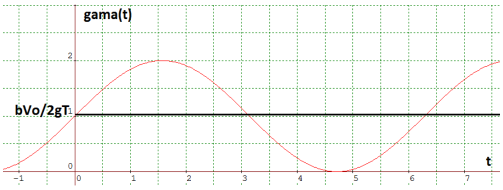

Figura 8: Para 0< t <T;$\omega t = 2\pi$

$$A' \sin(\omega t) + B' \cos(\omega t)$$
$$A'\omega \cos(\omega t) - B'\omega \sin(\omega t)$$

CI do trecho:

$$x(T) = \frac{bV_0}{2gT}(1 - \cos(\omega t)) = A' \sin(\omega t) + B' \cos(\omega t)$$

$$\dot{x}(T) = \frac{bV_0}{2gT}(\omega \sin(\omega t)) = A'\omega \cos(\omega t) - B' \sin(\omega t)$$