PME 3380 - Lucas Nigro Matheo - 10772911

Exs do dia 17/09/2020

① Linearizar $f(x) = \cos x$ em $\bar{x} = 0$

Série de Taylor até o 2° termo

$$\cos(x) \approx \cos(\bar{x}) + \left.\frac{d(\cos(x))}{dx}\right|_{x=\bar{x}} (x - \bar{x}) + \text{Ordem superior}^{0}$$

$$\cos(x) \approx \cos(0) + (-\operatorname{sen} 0)(x - 0) \rightarrow \cos(x) = 1$$

b) Em torno de $\bar{x} = \frac{\pi}{4}$

Série de Taylor até o 2° termo

$$\cos(x) \approx \cos(\bar{x}) + \left.\frac{d(\cos(x))}{dx}\right|_{x=\bar{x}} (x - \bar{x}) + \text{Ordem superior}^{0}$$

$$\cos(x) \approx \cos\left(\frac{\pi}{4}\right) + \left(-\operatorname{sen}\left(\frac{\pi}{4}\right)\right)\left(x - \frac{\pi}{4}\right)$$

$$\cos(x) \approx \frac{\sqrt{2}}{2}\left[1 - \left(x - \frac{\pi}{4}\right)\right]$$

② Linearizar $f(\dot{v}, r, \dot{r}, v, x) = -m\dot{v} - mr\dot{v} + mx\ddot{r} = -F(t)$

$$-F(t) \approx f(\bar{\dot{v}}, \bar{r}, \bar{\dot{r}}, \bar{v}, \bar{x}) + \left.\frac{\partial f}{\partial \dot{v}}\right|_{\text{equilíbrio}} (\dot{v} - \bar{\dot{v}}) + \left.\frac{\partial f}{\partial r}\right|_{\text{equilíbrio}} (r - \bar{r}) +$$

$$+ \left.\frac{\partial f}{\partial \dot{r}}\right|_{\text{equil}} (\dot{r} - \bar{\dot{r}}) + \left.\frac{\partial f}{\partial v}\right|_{\text{equil}} (v - \bar{v}) + \left.\frac{\partial f}{\partial x}\right|_{\text{equil}} (x - \bar{x})$$

$f(\bar{\dot{v}}, \bar{r}, \bar{\dot{r}}, \bar{v}, \bar{x}) = 0$, pois, no equilíbrio, $\dot{v} = \bar{r} = \bar{\dot{r}} = 0$

Teremos:

$$\left.\frac{\partial f}{\partial x}\right|_{eq} = \left.\frac{\partial f}{\partial v}\right|_{eq} = 0 \quad e \quad \left.\frac{\partial f}{\partial r}\right|_{eq} = -m\bar{v}; \quad \left.\frac{\partial f}{\partial \dot{r}}\right|_{eq} = -m; \quad \left.\frac{\partial f}{\partial \ddot{r}}\right|_{eq} = m\bar{x}$$

Ficamos com

~~ftx~~

$$-F(t) = -m\bar{v}_n + m\bar{x}\dot{n} - m\dot{v} \Rightarrow$$

$$\boxed{m\dot{v} = -m\bar{v}_n + m\bar{x}\dot{n} + F(t)}$$