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PME 3380 - Modelagem de Sistemas Dinâmicos

Ex. Aula 17/09

① Linearização de $f(x) = \cos x$, $\begin{cases} \bar{x}_0 = 0 \\ \bar{x}_0 = \pi/2 \end{cases}$

$$f(x) \to f(\bar{x}_0) + \left.\frac{df}{dx}\right|_{x=\bar{x}_0} \cdot (x - \bar{x}_0)$$

- Para $x_0 = 0$

$$f(x) \to \cos x_0 - \operatorname{sen} x_0 \cdot (x - x_0) \simeq 1 \simeq f(0)$$

- Para $x_0 = \pi/2$

$$f(x) \to \cos \pi/2 - \operatorname{sen} \pi/2 \,(x - \pi/2) = \pi/2 + x$$

② Linearização de $f(\dot{v}, r, \dot{r}, U, x) = -m\dot{v} - mrU + mx\dot{r} = -f(t)$

$$-f(t) = f(\bar{\dot{v}}, \bar{r}, \bar{\dot{r}}, \bar{U}, \bar{x}) + \left.\frac{\partial f}{\partial \dot{v}}\right|_{eq} (\dot{v} - \bar{\dot{v}}) + \left.\frac{\partial f}{\partial r}\right|_{eq} (r - \bar{r}) + \frac{\partial f}{\partial \dot{r}} (\dot{r} - \bar{\dot{r}})$$

$$+ \left.\frac{\partial f}{\partial U}\right|_{eq} (U - \bar{U}) + \left.\frac{\partial f}{\partial x}\right|_{eq} (x - \bar{x})$$

No equilíbrio, $\bar{r} = 0$, $\bar{\dot{r}} = 0$, $\bar{\dot{v}} = 0$

$$-f(t) = -m\dot{v} - m\bar{v}_r + m\bar{x}_r$$