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PME3380 - Modelagem de sistemas dinâmicos

Exercício aula 17/09

1) Linearizar $f(x) = \cos x$

Por Série de Taylor: $f(x) = f(\bar{x}) + \left.\frac{df}{dx}\right|_{x=\bar{x}} (x-\bar{x})$

Logo: $f(x) = \cos\bar{x} - \operatorname{sen}\bar{x}\cdot(x-\bar{x})$

Para $\bar{x}=0$, $f(x)=1$

Para $\bar{x}=\frac{\pi}{4}$, $f(x) = \frac{\sqrt{2}}{2}\left(1+\frac{\pi}{4}-x\right)$

2) Linearizar $m\dot{v} = F(t) - m\mu r + m x\dot{r}$

$f(F,u,r,x,\dot{r}) = F(t) - m\mu r + m x\dot{r}$ e $\bar{r} = \dot{\bar{r}} = 0$

$f(F,u,r,x,\dot{r}) = \cancel{\bar{F}} - m\bar{u}\cancel{\bar{r}} + m\bar{x}\cancel{\dot{\bar{r}}} + 1\cdot(F-\cancel{\bar{F}}) - m\cancel{\bar{r}}(u-\bar{u}) - m\bar{u}(r-\cancel{\bar{r}})$
$+ m\cancel{\dot{\bar{r}}}(x-\bar{x}) + m\bar{x}(\dot{r}-\cancel{\dot{\bar{r}}})$

$f(F,u,r,x,\dot{r}) = F(t) - m\bar{u}r + m\bar{x}\dot{r}$

$m\dot{v} = F(t) - m\bar{u}r + m\bar{x}\dot{r}$