Day 29

Tracking

AE353

Spring 2022

Bretl

$\dot{m} = f(m, n)$

$0 = f(m_e, n_e)$

$\dot{x} = Ax + Bu$

$x = m - m_e$

$u = n - n_e$

$u = -Kx$

$0 = f(\bar{m}_e, \bar{n}_e)$

$\dot{x} = Ax + Bu$

$x = m - \bar{m}_e$

$u = n - \bar{n}_e$

$u = -Kx$

$$\left.\frac{\partial f}{\partial m}\right|_{(m_e, n_e)} = \left.\frac{\partial f}{\partial m}\right|_{(\bar{m}_e, \bar{n}_e)}$$

$x = m - \bar{m}_e$

$u = -Kx$

$n = u + \bar{n}_e$

$$x = m - \bar{m}_e$$
$$u = -Kx$$
$$n = u + \bar{n}_e$$

↓

$$\begin{aligned} n &= u + \bar{n}_e \\ &= -Kx + \bar{n}_e \\ &= -K(m - \bar{m}_e) + \bar{n}_e \end{aligned}$$

$$x_{des} = \bar{m}_e - m_e$$
$$u_{des} = \bar{n}_e - n_e$$

$$x = m - m_e$$
$$u = u_{des} - K(x - x_{des})$$
$$n = u + n_e$$

↓

$$\begin{aligned} n &= u + n_e \\ &= u_{des} - K(x - x_{des}) + n_e \\ &= \bar{n}_e - n_e - K(m - m_e - (\bar{m}_e - m_e)) + n_e \\ &= \bar{n}_e - K(m - \bar{m}_e) \end{aligned}$$

full state feedback

$$x_{des} = \bar{m}_e - m_e$$
$$u_{des} = \bar{n}_e - n_e$$

$$x = m - m_e$$
$$u = u_{des} - K(x - x_{des})$$
$$n = u + n_e$$

partial state feedback

$$\begin{cases} x_{des} = \bar{m}_e - m_e \\ u_{des} = \bar{n}_e - n_e \end{cases}$$

$$u = u_{des} - K(\hat{x} - x_{des})$$
$$n = u + n_e$$

$$\begin{cases} y = o - g(m_e, n_e) \\ \dot{\hat{x}} = A\hat{x} + Bu - L(C\hat{x} - y) \end{cases}$$