

Day 31

Planning

AE 353

Spring 2022

Bretl

TRACKING

$$\begin{aligned}\dot{m} &= f(m, n) \\ 0 &= g(m, n)\end{aligned}$$

$$m = \begin{bmatrix} p_x \\ p_y \\ p_z \\ \psi \\ \theta \\ \phi \\ \vdots \end{bmatrix}$$

$$\begin{bmatrix} T_x \\ T_y \\ \tilde{z} \\ f_z \end{bmatrix}$$



$$\begin{aligned}\dot{x} &= Ax + Bu \\ y &= Cx\end{aligned}$$

$$\begin{aligned}x &= m - m_e \\ u &= n - n_e \\ y &= 0 - g(m_e, n_e)\end{aligned}$$



$$\begin{aligned}u &= u_{des} - K(\hat{x} - x_{des}) \\ \dot{\hat{x}} &= A\hat{x} + Bu - L(C\hat{x} - y)\end{aligned}$$

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



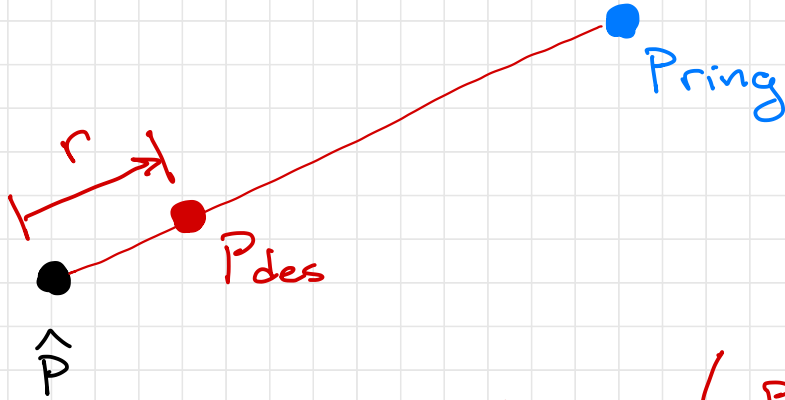
$$\underbrace{\left. \frac{\partial f}{\partial m} \right|_{(m_e, n_e)} = \left. \frac{\partial f}{\partial m} \right|_{(\bar{m}_e, \bar{n}_e)}}_{}$$

$$A = \bar{A}$$

$$B = \bar{B}$$

$$C = \bar{C}$$

How to choose x_{des} AND u_{des} ?



$$P_{des} = \hat{P} + r \left(\frac{P_{ring} - \hat{P}}{\|P_{ring} - \hat{P}\|} \right)$$

$$\dot{m}(t) = g(m(t), n(t))$$

$$\dot{m}_e(t) = f(m_e(t), n_e(t))$$

$$\dot{x}(t) = A(t)x(t) + B(t)u(t)$$

$$x(t) = m(t) - m_e(t)$$

$$u(t) = n(t) - n_e(t)$$