

nonlinear process

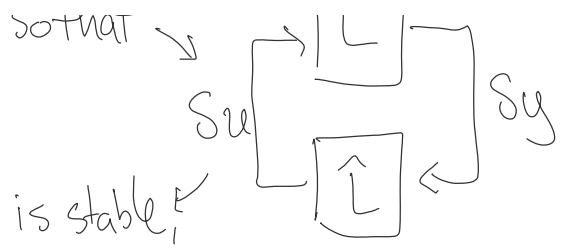
goal: apply full-state observer + controller to nonlinear system using linearization

refs: Hespanha 2009 Ch 2

Astrom & Murray 2019 Ch 6

- suppose given $\begin{cases} \dot{x} = f(x, u) \\ y = h(x, u) \end{cases}$ with operating point / equilibrium (x_0, u_0) s.t. $f(x_0, u_0) = 0$
 NL (let $y_0 = h(x_0, u_0)$)
- linearize to obtain $\begin{cases} \delta \dot{x} = A \delta x + B \delta u \\ \delta y = C \delta x + D \delta u \end{cases}$ where: $x \approx x_0 + \delta x$
 L $u \approx u_0 + \delta u$
 $y \approx y_0 + \delta y$
- synthesize full-state observer + controller $\begin{cases} \delta \dot{\hat{x}} = A \delta \hat{x} + B \delta u - L(\delta \hat{y} - \delta y) \\ \delta \hat{y} = C \delta \hat{x} + D \delta u, \delta u = -K \delta \hat{x} \end{cases}$





i.e. $\delta x, \delta \hat{x} \rightarrow 0$

