

Robust and Optimal Control

A Two-port Framework Approach

CSD approach to H-infinity Controllers

Outline

- Introduction
- System Specification
- Current controller design
- Speed controller design
- Simulation
- Conclusion

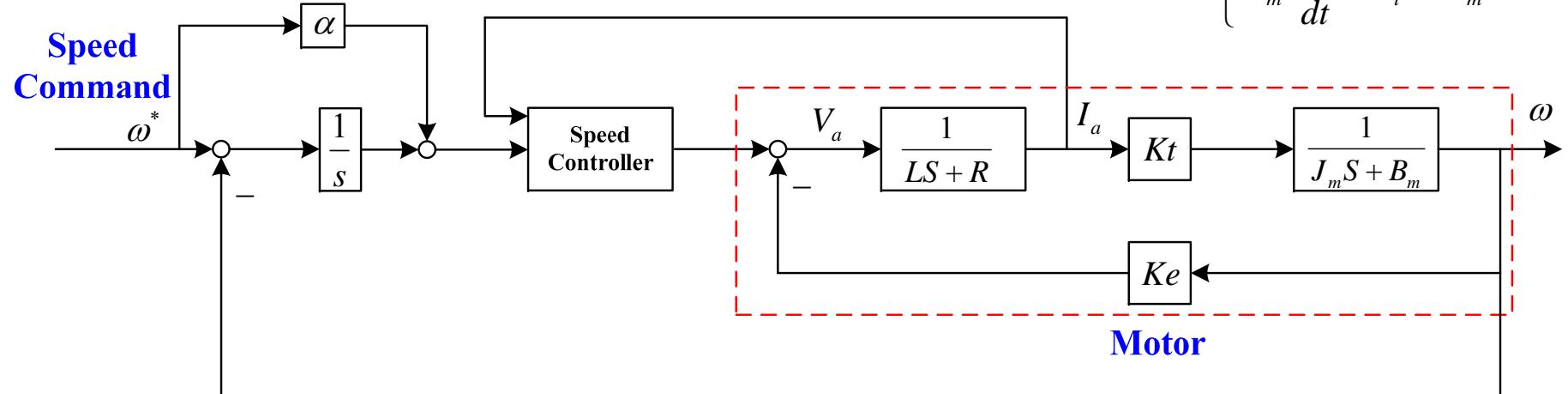
Introduction

Purpose: Design a controller for velocity control of servo motor

Target: Minimum the tracking error

Controller: H_∞ Controller

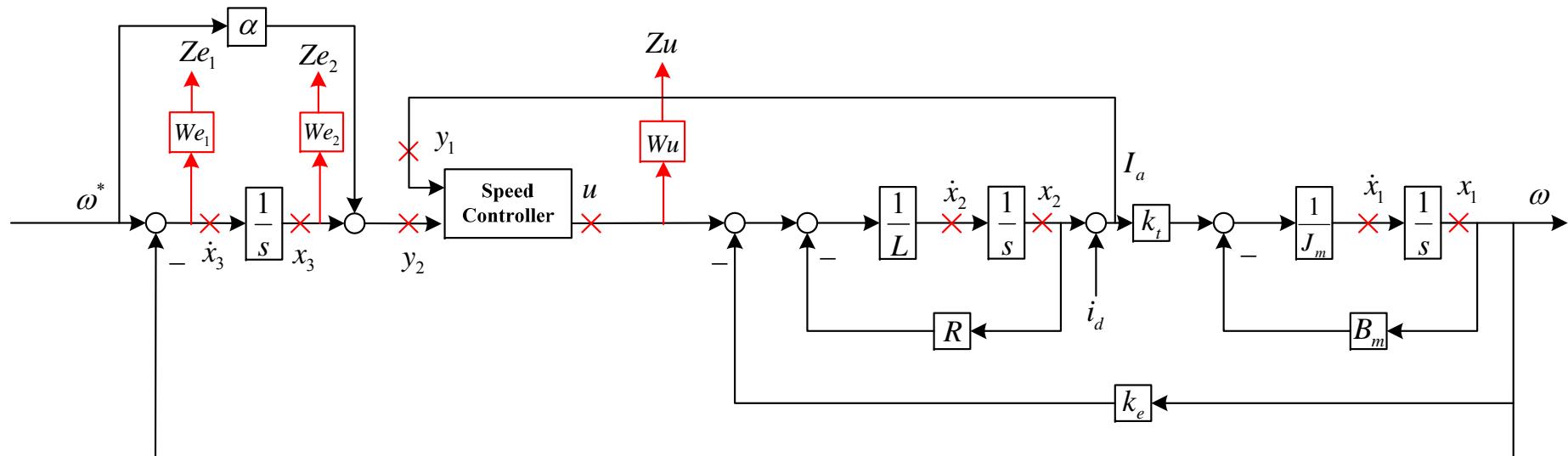
Block Diagram:



Dynamic equation of the motor:

$$\begin{cases} V = iR_c + L \frac{di}{dt} + k_e \omega \\ J_m \frac{d\omega}{dt} = k_t i - B_m \omega \end{cases}$$

System Specification



$$\|LFT_l(P, K_\infty)\|_\infty < \gamma = 2.5$$

$$\|LFT_l(P_\gamma, K_\infty)\|_\infty < 1$$

Items	Parameters
Motor	Back-EMF Constant, k_e (V-s/rad)
	0.21
	Torque Constant, k_t
	0.21
	Inductance, L (mH)
	3.8
Resistance , R (Ω)	7.155
Inertia, J ($\text{kg}\cdot\text{m}^2$)	$5.77 \cdot 10^{-5}$
Damping, B ($\text{N}\cdot\text{m}\cdot\text{s}/\text{rad}$)	$5.5 \cdot 10^{-4}$