

Continuous Control via State Space Methods

Topics

Review of LTI ordinary differential equations
Steady state and transient responses
Second order systems
Transfer functions and frequency response
Signal flow graphs and Mason's gain formula
State equations and similarity transforms
Canonical forms and transformation between forms
Controllability and Observability
Eigenvalues and Eigenvectors
Frequency response via transfer function from state eq'ns
Time domain response via state transition equations
Difference equations and state transition matrix properties
Poles, zeros, and transfer functions from the state eq'ns
Compensation via state feedback, Ackermann's formula
Weak controllability, effects of zeros
Full state feedback with reference input, regulators
Effects of full state feedback on system zeros
Pole selection, dominant 2nd order method
Optimal pole selection, optimal Symmetric Root Locus
Cheap/Expensive control in Linear Quadratic Regulators
Full order estimator design
Pole selection, dominant 2nd order and optimal SRL
Compensators w/ full-state feedback and a state estimator
Regulators w/ reference input and compensator
Integral control for reduction of steady state error
*Reduced order estimators

Franklin, Powell & Emani-Naeini

2.1, 2.6
3.3, 3.4, 3.5
3.2
2.2, 7.1
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7.2.1
7.2.1
pp 504, C.12
7.2.2, C.10
8.5, C.14
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7.2.2
7.3, 7.3.1
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7.3.2
pp 528-529
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7.4.2
7.4.2, 7.4.3
7.5, 7.5.1
7.5.3
7.6
7.8
7.9, 7.9.1
*7.5.2

*time permitting