

Department of Mechanical and Materials Engineering

Ph.D. Comprehensive Study Guide

Automatic Controls

2014

Textbook: K. Ogata, Modern control engineering, Fifth Edition, Prentice Hall Inc. , ISBN 0-13-615673-8

Topic Covered:

Chapter 1: Introduction to control systems (1.1-1.4).

Chapter 2: Mathematical modeling of control systems(2.1-2.3).

Transfer function and impulse-response function, block diagram implications (not include the state space modeling).

Chapter 3: Mathematical modeling of mechanical systems and electrical systems. Newton's law in modeling mechanical systems, Kirchhoff's law in modeling electrical systems, (3.1-3.3).

Chapter 5: Transient and steady-state response analyses. first order systems, second order systems, transient response, Routh's stability, control actions on system performance, steady-state errors (5.1-5.8).

Chapter 6: Control systems analysis and design by the root-locus method. Root-locus plots, root locus in control system design, lead and lag compensation (6.1-6.3, 6.5-6.7).

Chapter 7: Control systems analysis and design by the frequency-response method. Frequency response, bode diagram (7.1-7.2).

Chapter 8. PID controllers and modified PID controllers. Ziegler-Nichols rules for tuning PID controllers (8.1-8.2).