

Control Engineering

Syllabus Number

3E324

Special Subjects

Elective 2 credit

FUKUSHIMA YUTA

1. Course Description

We learn behavior of dynamical systems with inputs, how their behavior is modified by feed back and mathematical tools such as Laplace transform, etc.

This course is related to DP4

2. Course Objectives

- (1) We will learn how to draw block diagram of dynamic system
- (2) We will learn how to model continuous system
- (3) We will learn how to analyze dynamic system using frequency response
- (4) We will learn how to analyze stability of dynamic system

3. Grading Policy

Evaluation rate are Report 20 %, midterm exam 40%, final exam(40%).

All the reports should be submitted.

4. Textbook and Reference

Textbook

Text book in this course is 宇津木 諭「絵ときでわかる機械制御」(オーム社), ISBN: 978-4-274-20287-2.

We also use LMS and handouts.

5. Requirements(Assignments)

Preparation for the class: 1.5 hours

Review of the class : 1.5 hours

6. Note

Course contents might be modified.

7. Schedule

- [1] Introduction to Control System
- [2] Laplace transform (1) : Laplace transform of the general time function, property of the Laplace transform, inverse Laplace transform
- [3] Laplace transform (2) : Laplace transform and differential equation
- [4] Transfer function and block diagram (1) : transfer function, block diagram, equivalence circuit, base element
- [5] Transfer function and block diagram (2) : first-order system, second-order system
- [6] Time response of system : impulse response, step response, ramp response
- [7] Transient property and state characteristic of transfer function
- [8] Mid term exam and review
- [9] Feedback control and stability
- [10] Frequency property of transfer function (1) : vector locus, Nyquist locus
- [11] Frequency property of transfer function (2) : bode diagram
- [12] Stability analysis (1): nyquist stability criterion
- [13] Stability analysis (2): stability margin
- [14] PID control
- [15] Final exam and review