

Syllabus 2017 System Information Sciences System Control Science

Japanese

Basic information

held this year:	yes
instructor(s)	Prof. Kazuhiro Kosuge (Graduate School of Engineering) Prof. Kazuya Yoshida (Graduate School of Engineering) Prof. Koichi Hashimoto Assoc. Prof. Yasuhisa Hirata
room	Mech-1
schedule	The first half year (Wednesday) 10:30–12:00
begins on:	04/12

Objectives and outline

Lectures are given in English.

1. Objective

Systems with novel mechanisms are developed in many advanced applications including medical support, welfare, space exploration, and disaster rescue activities. The objective of this lecture is to learn methodologies for designing highly complicated mechanical systems through modern linear and nonlinear control systems.

2. Abstract

First, modern linear control system design methods are reviewed. Numerical examples are given and students are required to solve examples using MATLAB. Next introduction of nonlinear dynamical systems is given and methods for analysis of nonlinear systems, including phase analysis and Lyapunov methods, are presented. Finally nonlinear feedback control designs are described.

3. Goals

Understanding the following topics are shown as goals of this lecture:

- Linear system design and how to use software tools
- Stability of nonlinear dynamical equations
- Phase analysis and Lyapunov methods
- Feedback linearization
- Robust nonlinear control system design

Class plan

1. Linear system design

State space, Linear quadratic optimal control, Kalman filter

2. Stability of nonlinear dynamical equations

Phase analysis, Equilibrium points, Lyapunov methods, Linearization

3. Feedback linearization

Input–State linearization, Feedback linearization of SISO systems and MIMO systems

4. Robust nonlinear control system design

Passivity, Robot systems, Adaptive systems

Evaluation

Final exam. Reports and attendance may be considered.

Textbook(s)

Applied Nonlinear Control, Jean–Jacques E. Slotine and Weiping Li, Prentice–Hall International Press

Web site

Office hours

Appointments by email

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