Topics in Control Systems

Differential games

MTH 610–004 (64855)

TTh 10:00–11:15, Rm: NH 346

Course Information

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Office Hours: Tuesday, Thursday 12:30–1:30 (or by arrangement)

Syllabus: We will cover the basic concepts in the theory and application of differential games. A more detailed outline is given below.

Textbook: We will mostly follow the text *Differential games in economics and management science*, by Engelbert Dockner, Steffen Jørgensen, Ngo Van Long, and Gerhard Sorger, Cambridge University Press, 2000. We will derive some additional material from other sources.

Website Most of the handouts will be posted on the website as well. The site will contain other useful links and last minute announcements.

Other: If you have a disability and are in need of academic accommodations, please notify the instructor immediately to arrange needed support.

Course Outline

- Basic concepts of static games: strategies, payoff functions, Nash equilibria. Examples: Prisoner's dilemma, Cournot duopoly.
- Dynamic games, Stackelberg strategies, Markovian and open-loop strategies.
- Basic optimal control concepts. Pontryagin Maximum Principle, Hamilton-Jacobi-Bellman equation.
- Differential games, Markovian equilibria, time consistency, subgame perfectness, trigger strategies equilibria.
- Games with special structure: Linear quadratic games.
- Applications to resource and environmental economics and other areas depending on interest of students.
- Games of pursuit and evasion.