Institut für Systemtheorie und Regelungstechnik

Tube Model Predictive Control

Short course announcement

Description:

This short course deals with a recently developed Model Predictive Control (MPC) method for uncertain systems. In the presence of uncertainties, it necessary to replace the predicted state and control sequences by the sets of possible states and controls due to the spread of trajectories caused by the uncertainty. This results in state and control „tubes" which represent either the exact or outer-bounding sequences of the sets of possible states and associated controls. The tubes allow for generalized but natural predictions based on which it is possible to guarantee the robust state and control constraint satisfaction for the controlled uncertain state sequences and the associated sequences of control actions.

The tube MPC resembles the classical MPC in that the prediction paradigm remains the same but with a major difference that the role of the state and control sequences is played by the state and control tubes. The adequate state-control tube and the associated control policy parameterizations lead to a computationally highly attractive tube MPC synthesis, which under mild and natural conditions, induces strong system theoretic properties of the controlled, constrained, uncertain dynamics.

Topics covered in the short course include:

- Control Synthesis Under Constraints and Uncertainty: Basic Notions and Facts.
- Tube Model Predictive Control: State Feedback Case.
- TubeModel Predictive Control: Output Feedback and Nonlinear Cases.

Dates:

Monday, June 6 to Friday, June 10, 2x90 minutes per day;
exact times will be posted on the website:
http://www.ist.uni-stuttgart.de/education/courses/MPC

Place:

IST-Seminar-Room 3.243 · Pfaffenwaldring 9 · Campus Stuttgart-Vaihingen

Prerequisites:

Basic knowledge in control and in particular MPC

Lecturer:

Dr. Saša V. Raković, Oxford University
and Otto-von-Guericke University Magdeburg.

Biographical Information:

Saša V. Raković received the PhD degree in Control Theory from Imperal College London. His PhD thesis, entitled "Robust Control of Constrained Discrete Time Systems: Characterization and Implementation", was awarded the Eryl Cadwaladr Davies Prize as the best PhD thesis in the Electrical and Electronic Engineering Department of Imperial College London in 2005. He held posts of a Research Associate at Imperial College London and a Postdoctoral Researcher at the ETH Zurich. He is currently a Scientific Associate at the Institute for Automation Engineering, Otto–von–Guericke–Universität Magdeburg and a Visiting Academic Fellow at the Department of Engineering Sciences of the University of Oxford, UK. His main research interests and contributions lie within the areas of control synthesis and analysis as well as decision making under constraints and uncertainty.

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