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Einladung zum Vortrag

von Dr. Matthias A. Müller (Universität Stuttgart) zum Thema

Economic model predictive control: new approaches in optimization-based control

am Mittwoch, 22.06.2016, um 12:30 Uhr (ITZ SR011)

Abstract

Model predictive control (MPC) is an optimization-based control technology, which has found successful application in many different industrial fields. It consists of repeatedly solving a finite horizon optimal control problem and then applying the first part of the solution to the considered system. The main advantages of MPC and the reasons for its widespread success are that

(i) satisfaction of hard input and state constraints for the closed loop system can be guaranteed,
(ii) optimization of some performance criterion is directly incorporated in the controller design, and
(iii) it can be applied to nonlinear systems with possibly multiple inputs.

In this talk, we give a brief overview over the basic principle and available stability results of nonlinear MPC. We then focus on some recent developments in the field, so called economic MPC schemes. Here, in contrast to the classical control objective of stabilization, a more general performance criterion is considered which is possibly related to the economics of the considered system. In this case, the optimal operating behavior might not be stationary, but can be more complex (e.g. periodic). We present conditions that guarantee both closed-loop performance bounds and convergence to the optimal operating behavior. Furthermore, we discuss the concept of average constraints and briefly present two applications in process engineering and cooperative control.