

A novel tuning approach for offset-free MPC - DTU Orbit (08/11/2017)

A novel tuning approach for offset-free MPC

Since the beginnings in the chemical and process industry, model based predictive control strategies have become widely accepted. Often mentioned success factors for MPC are the use of optimization based on a plant model, the consideration of constraints, and an intuitive tuning. Indeed, if a nominal plant and overall objective are known, the tuning can become straightforward. However, as soon as disturbances have to be taken into account, the tuning effort increases and becomes less intuitive. Against this background, a novel strategy to address the issues with unknown disturbances is proposed. The idea is to separate the nominal tuning process and extend the control by an outer loop, which ensures offset-free control. The inner, nominal loop decouples the system and essentially leads to a first order response. This inner loop addresses the performance targets in the nominal case, and the outer loop provides offset-free control in case of unknown disturbances. The outer loop consists of feedback controllers adapting the reference, which due to the decoupling can be tuned by known guidelines. The proposed strategy is presented and evaluated using a simulated case study.

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