Universität Stuttgart
Institut für Systemtheorie und Regelungstechnik
Prof. Dr.–Ing. Frank Allgöwer

Open Thesis (MA)

Performance of MPC for tracking without terminal constraints

Description:

In a recent publication [1], we proved transient performance guarantees of model predictive control (MPC) for tracking. MPC for tracking, originally developed in [2], is a useful variant of MPC that incorporates artificial references as an additional decision variable in the optimisation problem. This allows the MPC to terminate the prediction at any admissible (artificial) reference that is optimal with respect to the cost. If the distance of the artificial reference to the reference that should be tracked is penalised, and certain conditions hold, the closed loop will converge to the best reachable reference. In this thesis, we would like to extend the results obtained in [1] to the case of MPC for tracking without terminal ingredients [3].

References:

[1] M. Köhler, L. Krügel, L. Grüne, M. A. Müller, and F. Allgöwer, "Transient Performance of MPC for Tracking," IEEE Control Syst. Lett., vol. 7, pp. 2545–2550, 2023. doi: 10.1109/LCSYS.2023.3287798
[2] D. Limón, I. Alvarado, T. Alamo, and E. F. Camacho, "MPC for tracking piecewise constant references for constrained linear systems," Automatica, vol. 44, no. 9, pp. 2382-2387, 2008. doi: 10.1016/j.automatica.2008.01.023
[3] R. Soloperto, J. Köhler, and F. Allgöwer, "A nonlinear MPC scheme for output tracking without terminal ingredients," IEEE Trans. Autom. Control, vol. 68, no. 4, pp. 2368–2375, 2023. doi: 10.1109/TAC.2022.3173494

Prerequisites:

- *Model Predictive Control*

Supervisor:

Matthias Köhler
Room 3.240

Area:

Model predictive control

Properties:

Type: MA

20% literature
70% theory
10% simulation

Beginning:

anytime

Further information on www.ist.uni-stuttgart.de/lehre/bama

Aushang vom January 26, 2024