# Open Thesis (MA)

Discounted economic MPC for general optimal operating behaviors

Description:

A model predictive controller (MPC) solves at each time step a finite-horizon optimal control problem. This optimization based structure allows to directly optimize over economic criterions like energy consumption or production amounts. However, often this economic stage cost is not positive definite, which can lead to stability/convergence problems. One solution is to use suitable terminal conditions, which, however, are difficult to design in practice. However, using a plain economic MPC scheme without terminal conditions can also cause problems even for arbitrarily long prediction horizons. Therefore, we want to make a simple modification of the latter case that needs no additional offline design: discounting the stage cost. The goal of this thesis is to rigorously analyze for which optimal operating behaviors (steady state, periodic, etc.) and for which discount functions (exponential, linear, etc.) we can guarantee an almost optimal asymptotic average performance.
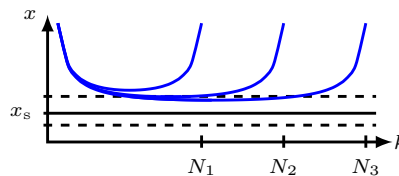
Prerequisites:

- The course *Model Predicitve Control* is required

- Experience with *Matlab* is desired

- Interest in *theoretical* derivations and *mathematical proofs* is essential

Supervisor:

Lukas Schwenkel
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Area:

MPC

Properties:

Type: **MA**

20% literature
50% theory
30% implementation

Beginning:

any time

Weitere Informationen: www.ist.uni-stuttgart.de/lehre/bama

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