Institut für Regelungstechnik
Leibniz Universität Hannover

Leibniz Universität Hannover

Student-/Masterthesis

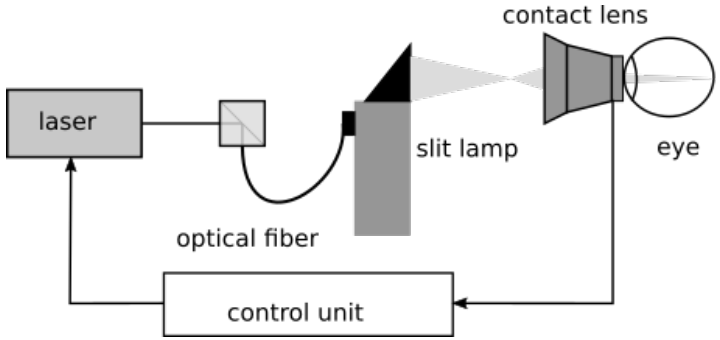
Robust output feedback MPC for reduced order models

One advantage of model predictive control (MPC) is that, among other things, input and state constraints can be taken into account directly in the controller design, thus ensuring additional safety. Especially in biomedical applications, such as retinal laser therapy, the adherence to maximum temperature values during irradiation is of particular importance to avoid complications due to too high temperatures and thus guarantee a safe treatment. An observer based on a spacially discretized and order-reduced heat diffusion can be used to approximate the peak temperature that is crucial for a therapeutic effect. Robust output feedback MPC approaches can take estimation errors and disturbances into account and ensure constraint satisfaction which is crucial for retinal laser therapies. As the full order model is too large for estimation and control, the system is reduced. The projection onto a low-dimensional space results in a reduction error. This error needs to be taken into account in a robust MPC scheme to ensure constraint statisfaction of the full order model.

In this thesis, robust output feedback reduced order model predictive controllers shell be implemented in Matlab, compared and differences emphasized. Special attention will be paid to the calculation of the error bounds which are necessary for a robust design.

Requirements: theroretical foundations in control theory (lectures nonlinear control and/ or model predictive control)

If you are interested please contact me before **19th July**.



Scheme of experimental setup

Contact
Viktoria Kleyman
Institute of Automatic Control (IRT)
Room A257, Appelstr. 11
E-Mail: kleyman@irt.uni-hannover.de
Tel.: +49-511-762-4517