

EINLADUNG ZUM MATHEMATISCHEN KOLLOQUIUM

Es spricht

Frau Prof. Dr. Sabine Pickenhain
(BTU Cottbus-Senftenberg)

Zum Thema:

**„Lyapunov-exponential asymptotic stabilization
of control constrained dynamical systems via optimal control - a
duality based approach“**

Kurzfassung; gemeinsame Arbeit mit Katharina Kolo (Titus Research GmbH, Wildau) und Valeriya Lykina (BTU Cottbus-Senftenberg):

We consider an infinite horizon optimal control problem $(P)_\infty$, realizing the Lyapunov-exponential stability of control constrained dynamical systems by the choice of corresponding state spaces as Weighted Sobolev spaces and the following regulator type objective.

$$J_\infty(x, u) = \int_0^\infty \frac{1}{2} (x^T(t)Wx(t) + u^T(t)Ru(t)) e^{\beta t} dt \rightarrow \min!$$

$$x \in W_2^{1,n}([0, \infty), e^{\beta t}), \quad \beta > 0$$

The presented work focuses on a dual-based treatment of the problem $(P)_\infty$. This dual problem, obtained by a Lagrange-type duality, leads to an infinite horizon variational problem, where the dual variables belong again to a weighted Sobolev space $W_2^{1,n}([0, \infty), e^{-\beta t})$ with a density function $e^{-\beta t}$. We succeeded to prove saddle point conditions as well as necessary optimality conditions and existence for the dual problem. For the numerical treatment of the dual problem we present a direct pseudo-spectral method based on generalized Laguerre polynomials. Convergence results can be proved for this numerical method. The application of the proposed method is illustrated by a Lotka-Volterra model with control constraints.

**Montag, 21. November 2022, 17:00 Uhr, Curie-Hörsaal
(Kaffee 16:30 Uhr im Raum C 325)**

Alle Interessierten sind herzlich eingeladen!

Ilmenau, 08.11.2022

Das Institut für Mathematik