Kolloquium Angewandte Mathematik
Prof. Thomas Apel (BAU1)
Prof. Matthias Gerdts (LRT1)
Prof. Markus Klein (LRT1)

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Vortragsankündigung

Am **Dienstag, den 20.11.2018,** hält **um 17:00 Uhr**

Christopher Schneider
(Ernst-Abbe-Hochschule Jena)

einen Gastvortrag über das Thema

Optimal Control with Bang-Bang Solutions: Regularization Techniques and Applications

Der Vortrag findet im **Raum 1431** in **Gebäude 33** statt.

Vortragszusammenfassung

The talk consists of two parts. In the first part, we study the impact of different regularization techniques on a class of linear-quadratic optimal control problems where the control variables are box-constrained and only appear linearly. With some structural assumptions on the switching function, those problems typically yield so-called *bang-bang solutions*. Adding regularization terms to the cost functional changes the structure of the optimal control. It is well-known that

(1) optimal control problems with (squared) L^2-control costs produce *Lipschitz continuous* solutions, and

(2) optimal control problems with L^1-control costs promote *sparse solutions*, i.e., the optimal control is zero on whole intervals.

We present a novel $L^{1,2}$-sparsity functional that promotes a so-called *group sparsity* structure of the optimal controls. In this case, the components of the control function take the value zero on parts of the interval, simultaneously. These problems are both theoretically interesting and practically relevant. The usefulness of our approach is demonstrated by solving a two-dimensional variant of the well-known *rocket car problem*.

In the second part of the talk, we consider the process of automatic optical material testing in the manufacturing of glass panels. To model this problem, we use an optimal control approach with a discontinuous cost functional and box constraints for both, the control and the state variables. The resulting problem turns out to have great similarities with the rocket car problem. We implement a prototype for this application which aims for computing the optimal control at run time. The algorithm will be demonstrated and tested with the help of an illustrative example where it turns out that the optimal control is of bang-bang or bang-zero-bang type, depending on the state constraints.

Alle Interessierten sind dazu herzlich eingeladen.