Universität
Konstanz

Wir laden recht herzlich zu einem Vortrag im Rahmen des

Oberseminars Numerische Optimierung

ein:

# Prof. Dr. Gabriele Eichfelder

(Technische Universität Ilmenau)

## *Multiobjective Mixed Integer Convex Optimization by a Decision Space Branch-and-Bound*

## Dienstag, 8. Juni 2021

Beginn: **16:00 Uhr**
Raum: **Zoom Room: https://zoom.us/j/99085685058?pwd=bEZrV0FoaDdFVHdCOFRZOUNBeHVzQT09**
Interessenten sind herzlich willkommen!

S. Volkwein

---

**Abstract**:

Multiobjective mixed integer convex optimization refers to mathematical programming problems where more than one convex objective function needs to be optimized simultaneously and some of the variables are constrained to take integer values. We present a branch-and-bound method based on the use of properly defined lower bounds. We do not simply rely on convex relaxations, but we built linear outer approximations of the image set in an adaptive way. We are able to guarantee correctness in terms of detecting both the efficient and the nondominated set of multiobjective mixed integer convex problems according to a prescribed precision. As far as we know, the procedure we present is the first deterministic algorithm devised to handle this class of problem which avoids to scalarize, i.e. which avoids formulating parameter dependent single-objective problems. This allows to do the branching simultaneously and efficiently for the complete Pareto front.

We give numerical results on biobjective and triobjective mixed integer convex instances. We also compare two branching strategies based on a partitioning of the feasible set in the pre-image space and by that we show that a non-standard one can have numerical advantages in case of multiple objectives. In contrast to criterion space methods, which are often limited to bi-objective problems, our approach can be generalized to an arbitrary number of objective functions.

This talk is based on joint work with Marianna De Santis, Julia Niebling, and Stefan Rocktäschel.

---

(eingeladen von Prof. Dr. Stefan Volkwein)