

## EINLADUNG ZUM MATHEMATISCHEN KOLLOQUIUM

Es spricht

**Frau Professorin Firdevs Ulus**

(Bilkent University, Department of Industrial Engineering)

Zum Thema:

### Approximation Algorithms for Bounded Convex Vector Optimization Problems and Convergence Results

**Abstract:**

In the literature, various algorithms exist for solving convex vector optimization problems to find polyhedral approximations to the Pareto frontier. These algorithms iteratively solve scalarization models that generally require a direction parameter in the objective space. The performance of such algorithms depends on the choice of this parameter. For bounded convex vector optimization problems, we propose a norm-minimizing scalarization and a primal algorithm based on solving them iteratively. Both the scalarization and the algorithm are free of direction-biasedness. We also propose modifications to this algorithm by introducing a suitable compact subset of the upper image, which helps in proving for the first time the finiteness of an algorithm for convex vector optimization and in establishing its convergence rate.

We also construct a geometric dual algorithm based on a geometric duality relation between the primal and dual images. Unlike existing approaches, the dual algorithm does not depend on a fixed direction parameter, hence aligned with the proposed primal algorithm. For a primal problem with a  $q$ -dimensional objective space, we formulate a dual problem with a  $(q+1)$ -dimensional objective space. Consequently, the resulting dual image is a convex cone. The constructed geometric dual algorithm gives a finite  $\epsilon$ -solution to the dual problem; moreover, it gives a finite weak  $\epsilon'$ -solution to the primal problem, where  $\epsilon'$  is determined by  $\epsilon$  and the structure of the underlying ordering cone.

**Dienstag, 05.12.2023, 15:00 Uhr, Curie-Hörsaal  
(Kaffee 14:30 Uhr im Raum C 325)**

**Alle Interessierten sind herzlich eingeladen!**

Ilmenau, 19.10.2023

Das Institut für Mathematik