



Lothar-Collatz-Kolloquium für Angewandte Mathematik

Donnerstag, den 12. Juni 2025, um 17:15 Uhr, im Hörsaal 5

Prof. Dr. Marc Pfetsch*

(Technische Universität Darmstadt, Fachbereich Mathematik)

Combinatorial Aspects of Physical Networks

Zusammenfassung/Abstract:

This talk considers combinatorial properties of physical networks like water, gas, heat, and electrical networks. One common model is given by potential-based flows, for which, in general, the corresponding flows depend in a nonlinear way on potentials (e.g., pressures) and are unique. The talk will review three different topics. The first is how the fact that flows in physical networks are acyclic can be used to strengthen mixed-integer optimization formulations and to derive combinatorial models. The second concerns the recovery of the structure of the network, given only information at the entries and exits. The talk will demonstrate positive and negative results in this direction. The third deals with topology optimization of such networks. Here, valid inequalities on the binary decision variables are derived using the nonlinear behavior of the network.

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