Lothar Collatz Seminar
Summer Semester 2020

July 1 · 4:15 pm · online

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Duality in Combinatorial Optimization: Total Dual Integrality

Abstract:

In mathematical optimization, and specifically in linear programming, a fundamental role is played by the duality. To every linear problem is associated a linear dual problem admitting an optimal solution with same value. At the same time, a desirable property of our linear problems is that they admit an optimal solution with integer value.

A system is totally dual integral if, for any linear problem defined on it, the associated dual problem admits an integer optimal solution. In this seminar we will discuss the importance of this concept presenting some recent results on a polyhedron that arises in applications: the flow cone.

We represent a flow of a graph as a circuit and a "special edge" of the circuit. The flow cone of a graph is the cone generated by the flows of the graph and the unit vectors. When the graph has no K_5-minor, Paul Seymour provided linear system describing this cone.

We prove that this system is totally dual integral if and only if the graph is series-parallel. Then, we refine this result and give the minimal integer TDI system describing this cone.

For further information please contact

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www.c3s.uni-hamburg.de/news-events/seminar-c3s.html