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Geometry of Network Design with Certain and Uncertain Demands

Polyhedral insights are presented for a network design problem. The task consists of determining a cost-optimal dimensioning of the arc capacities such that a specified list of demand patterns can be routed through the network. An exact approach using these insights is developed and evaluated. For some applications, the instances already contain pre-installed capacities that allow for a relatively high percentage of the demand to be routed. This makes an exact approach via iterative graph aggregation feasible.