CIRRELT

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LA CHAIRE DE RECHERCHE DU CANADA EN DISTRIBUTIQUE ET
LA CHAIRE DE RECHERCHE DU CANADA EN LOGISTIQUE ET EN TRANSPORT

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Pavillon André-Aisenstadt
Campus de l'Université de Montréal
2920, chemin de la Tour

CONFÉRENCIÈRE

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TITRE

A Polyhedral Study of the Network Pricing Problem with Connected Toll Arcs

RÉSUMÉ

Consider the tarification problem of maximizing the revenue generated by tolls set on a subset of arcs of a transportation network, where origin-destination flows (commodities) are assigned to shortest paths with respect to the sum of tolls and initial costs. This talk is concerned with a particular case of the above problem, in which all toll arcs are connected and constitute a path. Further, in order to allow for economies of scale, a complete toll subgraph is considered, where each arc corresponds to a subpath. Two variants of this problem are studied, with or without specific constraints linking together the tolls on the arcs. This problem is modelled as a linear mixed integer program, and is proved to be $\mathcal{NP}$-complete. Next, several kinds of valid inequalities are proposed, which strengthen some constraints of the initial model. Their efficiency is first shown theoretically, as those are facet defining for the restricted two-commodity problem. Also, we prove that some of the valid inequalities proposed, together with several constraints of the linear program, give a complete description of the convex hull of feasible solutions for a single commodity problem. Numerical tests have also been conducted, and highlight the real efficiency of the valid inequalities for the multi-commodity case. Finally, we point out the links between the problem studied in this talk and a more classical design and pricing problem in economics.

This work has been done jointly with Martine Labbé, Patrice Marcotte and Gilles Savard.

RESPONSABLE

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