

Split rank of triangle and quadrilateral inequalities

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A simple relaxation of any two rows of a simplex tableau is a mixed integer set consisting of two equations with two free integer variables and non-negative continuous variables. Recently Andersen et al. (2007) and Cornuejols and Margot (2008) show that the facet-defining inequalities of this set are either split cuts or intersection cuts, the so-called triangle and quadrilateral inequalities. These new families of inequalities can be used to generate valid cutting planes from any two rows of a simplex tableau.

Through a result by Cook et al. (1990) (and more recently in a generalization by Li and Richard (2008)) it is known that one particular class of facet-defining triangle inequality does not have a finite split rank, i.e. it cannot be obtained by repeated application of split cuts. In this paper, we prove that all the other facet-defining triangle and quadrilateral inequalities have a finite split-rank. The proof is constructive, i.e. for all the facet-defining triangle and quadrilateral inequalities we present an explicit sequence of split inequalities that can be used to generate them.