On the Mixed Set Packing and Covering Problem

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Abstract

We study the polyhedral structure of the mixed set covering, partitioning and packing problem, which has drawn little attention in the literature but has many real-life applications. By taking the "interactions" between the different types of edges into account, we derive a new class of valid inequalities, which we call the mixed odd-hole inequality. The inequality is strong in the sense that it is facet-defining for the mixed odd-hole polytope except in two special cases, where it represents an improper face. With the inclusion of the inequality, the mixed odd-hole polytope is completely characterized. We also provide several classes of valid inequalities (including implicit constraints of covering and packing types), generalize the mixed odd-hole inequality to accommodate the use in general mixed problems and provide a sufficient condition for the inequality to be facet-defining.

Keywords: *packing, covering, odd hole, valid inequalities*

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