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On Strong Lift-and-Project Operators versus Chipped and Cropped Hypercubes

In this talk, we focus on several semidefinite-optimization-based lift-and-project operators, including operators due to Lasserre and variants of the Sherali-Adams and Bienstock-Zuckerberg operators. We study their performance on some elementary polytopes – hypercubes that are chipped (at least one vertex of the hypercube removed by intersection with a closed halfspace) or cropped (all 2^n vertices of the hypercube removed by intersection with 2^n closed halfspaces) to varying degrees of severity ρ , and prove bounds on ρ where these operators would perform badly on the aforementioned examples. We also show that the integrality gap of the chipped hypercube is invariant under the application of several lift-and-project operators of varying strengths.

This is joint work with Levent Tunçel from the University of Waterloo.