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Taking advantage of Degeneracy and Special Structure in Linear Cone Optimization

The elegant theoretical results for strong duality and strict complementarity for LP lie behind the success of current algorithms. However, the theory and preprocessing for LP can fail for cone programming over nonpolyhedral cones. Surprisingly, many instances of SDP problems that arise from relaxations of hard combinatorial problems are degenerate. Rather than being a disadvantage, we show that this degeneracy can be exploited if the problem has some special structure. In particular, several huge instances of SDP completion problems can be solved quickly and to extremely high accuracy. In particular, we illustrate this on the sensor network localization problem.