On the stability of semidefinite relaxations

Diego Cifuentes, Massachusetts Institute of Technology

We consider a parametric family of polynomial optimization problems over algebraic sets. Although these problems are typically nonconvex, tractable convex relaxations via semidefinite programming (SDP) have been proposed. Often times in applications there is a natural value of the parameters for which the relaxation will solve the problem exactly. We study conditions under which the relaxation will continue to be exact as the parameter moves in a small neighborhood of the original one. Our framework captures several estimation problems such as low rank approximation, camera triangulation, rotation synchronization and approximate matrix completion. Our results guarantee that the SDP relaxation will continue to solve the problem in the low noise regime.