

Verifying Global Optimality of Candidate Solutions to Polynomial Optimization Problems using a Determinant Relaxation Hierarchy

We propose an approach for verifying that a given feasible point for a polynomial optimization problem is globally optimal. The approach relies on the Lasserre hierarchy and the result of Lasserre regarding the importance of the convexity of the feasible set as opposed to that of the individual constraints. By focusing solely on certifying global optimality and relaxing the Lasserre hierarchy using necessary conditions for positive semidefiniteness based on matrix determinants, the proposed method is implementable as a computationally tractable linear program. We demonstrate this method via application to several instances of polynomial optimization, including the optimal power flow problem used to operate electric power systems.