

A New Approach to Nonnegativity and Polynomial Optimization

Deciding nonnegativity of real polynomials is a fundamental problem in real algebraic geometry and polynomial optimization.

In 2014, Ilmanen and I introduced an *entirely new* nonnegativity certificate based on *sums of nonnegative circuit polynomials (SONC)*, which are *independent* of sums of squares. We successfully applied SONCs to global nonnegativity problems.

In 2016, Dressler, Ilmanen, and I proved a Positivstellensatz for SONCs, which provides a converging hierarchy of lower bounds for constrained polynomial optimization problems. These bounds can be computed via relative entropy programming establishing SONCs as a promising alternative to SOS based SDP methods for applications.

In this talk I will give an overview about polynomial optimization via sums of nonnegative circuit polynomials.