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"Moment matrices for root finding"

Abstract:

Classical techniques for solving polynomial equations exploit the properties of quotient algebra associated to these polynomials. Typically, they involve normal form computation such as Gröbner basis or border basis. The solutions can then be obtained by eigenvalue/eigenvector computation.

In this talk, we consider alternative methods which exploit properties of the dual of the quotient ring. We show how the classical algebraic approach can be "dualized" to compute the roots of a zero-dimensional complete intersection ideal or the radical or the real radical of an ideal. This involves linear algebra on moment matrices and flat extension properties, which are basic ingredients of relaxation methods for optimization.