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A moment theoretic approach to estimate the cardinality of certain algebraic varieties.
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Summary: For \( n \in \mathbb{N} \), we consider the algebraic variety \( V \) obtained by intersecting \( n+1 \) algebraic curves of degree \( n \) in \( \mathbb{R}^2 \), when the leading terms of the associated bivariate polynomials are all different. We provide a new proof, based on the Flat Extension Theorem from the theory of truncated moment problems, that the cardinality of \( V \) cannot exceed \( \binom{n+1}{2} \). In some instances, this provides a slightly better estimate than the one given by Bézout’s Theorem. Our main result contributes to the growing literature on the interplay between linear algebra, operator theory, and real algebraic geometry.

MSC:
- 47A57 Linear operator methods in interpolation, moment and extension problems
- 44A60 Moment problems
- 14H50 Plane and space curves
- 15-04 Software, source code, etc. for problems pertaining to linear algebra

Keywords:
flat extension theorem; planar algebraic curves; truncated moment problems; Bézout’s theorem

Full Text: Link

References:

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