Burgdorf, Sabine; Klep, Igor
Trace-positive polynomials and the quartic tracial moment problem. (English. Abridged French version) [Zbl 1205.15047]

A noncommutative polynomial \( f \in \mathbb{R}\langle X, Y \rangle \) is said to be trace-positive if for all symmetric \( n \times n \) matrices \( A \) and \( B \), the matrix \( f(A, B) \) has a nonnegative trace. I. Klep and M. Schweighofer have recently shown that such polynomials are intimately connected to Connes’ embedding conjecture [Adv. Math. 217, No. 4, 1816-1837 (2008; Zbl 1184.46055)]. The main result of the paper under review states that if a trace-positive polynomial \( f \) has degree \( \leq 4 \), then \( f = \sum_{i=1}^{4} g_i^* g_i + \sum_{j=1}^{r} [h_j, k_j] \) for some \( g_i, h_j, k_j \in \mathbb{R}\langle X, Y \rangle \).

An application to the truncated tracial moment problem is also given.

Reviewer: Matej Brešar (Maribor)

MSC:
15B48 Positive matrices and their generalizations; cones of matrices
16R99 Rings with polynomial identity
15A45 Miscellaneous inequalities involving matrices
13J30 Real algebra
46L35 Classifications of \( C^* \)-algebras

Keywords:
trace-positive polynomial; cyclic equivalence; sum of hermitian squares; tracial moment problem

Full Text: DOI Link

References:
[6] Connes, A., Classification of injective factors. cases \( \text{II}_1 \), \( \text{II}_\infty \), \( \text{III}_\lambda \), \( \lambda \neq 1 \), Ann. math. (2), 104, 1, 73-115, (1976)
[15] Powers, V.; Reznick, B., Notes towards a constructive proof of Hilbert’s theorem on ternary quartics, (), 299-227 · Zbl 0259.12001

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[19] Reznick, B., On Hilbert’s construction of positive polynomials, preprint


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