

Sums of hermitian squares as an approach to the BMV conjecture

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We consider the polynomial $S_{m,k}(X, Y)$ in the noncommuting variables X and Y which is the sum of all monomials of total degree m in which Y appears exactly k times. Besides the trivial cases $k = 0, 1, 2$ we exemplify that for $k = 4$ and arbitrary m the polynomial $S_{m,k}(X^2, Y^2)$ is a sum of hermitian squares and commutators of polynomials in X and Y . Further for $k = 2, 4$ and specific m representations of $S_{m,k}(X, Y)$ as a sum of hermitian squares are given. These results are interesting due to the BMV conjecture which states that the trace of $S_{m,k}(A, B)$ is nonnegative for all positive semidefinite matrices A and B of the same size.