Estimating the traces of powers of certain nonnegative matrices related to orthogonal polynomials

T. J. Laffey¹, R. Loewy ², and H. Šmigoc³

¹University College Dublin, thomas.laffey@ucd.ie
²Technion, loewy@technix.technion.ac.il
³University College Dublin, helena.smigoc@ucd.ie

In [1], inequalities satisfied by the traces of powers of a special nonnegative matrix arising in the study of the nonnegative inverse eigenvalue problem are found and results on the coefficients of certain related power series derived. Here, we answer similar questions for certain patterned matrices. Let $P_n$ be the $n \times n$ permutation matrix corresponding to the cycle $(1\ 2\ \ldots\ n)$ and let $C_n$ be the circulant $P_n + P_n^{-1}$. Using power series, we study the traces of the powers of $C_n$ and several related matrices associated with orthogonal polynomials. The expansion in powers of $t$ of

$$\left(\frac{2}{1 + \sqrt{1 - 4t^2}}\right)^c$$

plays a fundamental role.

References