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LOWER BOUNDS FOR THE SPREAD OF A NONNEGATIVE MATRIX

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Abstract. Given an integer $n \geqslant 2$ and a real number $a \geqslant 0$, let $\mathscr{C}_n(a)$ be the collection of all nonnegative $n \times n$ matrices $A = [a_{i,j}]_{i,j=1}^n$ such that $a = \min_{1 \leqslant i \leqslant n} a_{i,i}$ and $r(A) > a$, where $r(A)$ denotes the spectral radius of A. We prove some lower bounds for the spread $s(A)$ of $A \in \mathscr{C}_n(a)$ that is defined as the maximum distance between any two eigenvalues of A. In particular, we prove that

$$s(A) > \frac{2}{2+\sqrt{2n}}(r(A)-a)$$

for all $A \in \mathscr{C}_n(a)$.

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