LOWER BOUNDS ON THE MINIMAL COORDINATE-DEPENDENT GROWTH RATE IN A NONNEGATIVE MULTIPLICATIVE SYSTEM

by

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Abstract

This paper concerns a nonnegative $N \times N$ matrix Q and, more generally, a system $\{Q^\delta : \delta \in D\}$ of such matrices whose rows are in product form. Denote as $\sigma(Q)$ the spectral radius of Q, and call a nonempty subset J of $\{1, ..., N\}$ closed under Q if $Q_{ij} = 0$ for $i \in J$ and $j \notin J$. Linear systems that characterize upper bounds on $\sigma(Q)$ and $\max_\delta \sigma(Q^\delta)$ are classic. This paper presents linear systems that characterize lower bounds on $\min_\delta \min_J \sigma[(Q^\delta)_{JJ}]$ where δ ranges over D and J ranges over sets that are closed under Q^δ. These results are used to characterize lower bounds on the minimal coordinate-dependent growth rate in the corresponding multiplicative systems.