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GIRTH AND SUBDOMINANT EIGENVALUES FOR STOCHASTIC MATRICES*

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Abstract. The set $\mathcal{S}(g, n)$ of all stochastic matrices of order n whose directed graph has girth g is considered. For any g and n, a lower bound is provided on the modulus of a subdominant eigenvalue of such a matrix in terms of g and n, and for the cases $g = 1, 2, 3$ the minimum possible modulus of a subdominant eigenvalue for a matrix in $\mathcal{S}(g, n)$ is computed. A class of examples for the case $g = 4$ is investigated, and it is shown that if $g > 2n/3$ and $n \geq 27$, then for every matrix in $\mathcal{S}(g, n)$, the modulus of the subdominant eigenvalue is at least $(\frac{1}{5})^{1/(2\lfloor n/3 \rfloor)}$.

Key words. Stochastic matrix, Markov chain, Directed graph, Girth, Subdominant eigenvalue.

AMS subject classifications. 15A18, 15A42, 15A51.

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