CIDMA CENTRO DE I&D EM MATEMÁTICA E APLICAÇÕES CENTER FOR R&D IN MATHEMATICS AND APPLICATIONS

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Departamento de Matemática

Seminário OGTC

Optimization, Graph Theory and Combinatorics

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On the minimal $\mathcal{D}_\alpha-$ spectral radius of graphs subject to fixed connectivity

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Resumo

For a connected graph G and $\alpha \in [0,1]$, let $\mathcal{D}_\alpha(G)$ be the matrix

$$\mathcal{D}_\alpha(G) = \alpha\, Tr(G) + (1-\alpha)\mathcal{D}(G),$$

where $\mathcal{D}(G)$ is the distance matrix of G and $Tr(G)$ is the diagonal matrix of its vertex transmissions. Let K_m be a complete graph of order m. For n, s fixed, $n > s$, let $G_p = K_s \vee (K_p \cup K_{n-s-p})$ be the graph obtained from K_s and $K_p \cup K_{n-s-p}$ and the edges connecting each vertex of K_s with every vertex of $K_p \cup K_{n-s-p}$. This talk is about some extremal results on the spectral radius of $\mathcal{D}_\alpha(G)$ that generalize previous results on the spectral radii of the distance matrix and distance signless Laplacian matrix. Among all connected graphs G on n vertices with a vertex/edge connectivity at most s, it is proved that

1. there exists a unique $\underline{\alpha} \in (\frac{3}{4}, \frac{3n-s}{4n-2s})$ such that if $\alpha \in [0, \underline{\alpha})$ then the minimal spectral radius of $\mathcal{D}_\alpha(G)$ is uniquely attained by $G = G_1$,
2. there exists a unique $\overline{\alpha} \in (\frac{3}{4}, \frac{3n-s}{4n-2s})$, $\overline{\alpha} \geq \underline{\alpha}$, such that if $\alpha \in (\overline{\alpha}, 1)$ then the minimal spectral radius of $\mathcal{D}_\alpha(G)$ is uniquely attained by $G = G_{\lfloor \frac{n-s}{2} \rfloor}$, and
3. if $\alpha = 1$ then the minimal spectral radius of $Tr(G)$ is $n - 1 + \lceil \frac{n-s}{2} \rceil$ and it is uniquely attained by $G = G_{\lfloor \frac{n-s}{2} \rfloor}$.

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