

Characteristic subgraphs of some tricyclic reflexive cacti

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(joint work with Marija Rašajski)

A reflexive simple graph G is defined by the fact $\lambda_2(G) \leq 2$, λ_2 being the second largest eigenvalue of its $(0,1)$ -adjacency matrix. A graph is treelike, or a cactus, if all its cycles are mutually edge-disjoint. For many of treelike graphs their reflexiveness can be examined by removing a single cut-vertex. If it is not possible and if the cycles of a reflexive treelike graph do not form a bundle, it has at most five cycles [7]. On these two conditions it was possible to find all maximal reflexive cacti with more than three cycles [7] and to define four characteristic classes of tricyclic reflexive cacti [2]. In this paper we describe all maximal reflexive cacti of two out of those four characteristic classes, and we show the relations between these classes, one class of reflexive cacti with four cycles and one class of bicyclic reflexive graphs using a characteristic class of unicyclic graphs. As in some of the previous papers, we also see the special role of Smith graphs and we identify some special σ -transformations [8] of Smith graphs. Our results may be generalized and applied to certain classes of unicyclic and multicyclic graphs with the property that their second largest eigenvalue is not greater than a ($a > 0$), where a is the index of two characteristic subgraphs.

REFERENCES

- [1] D. Cvetković, M. Doob, H. Sachs: Spectra of graphs, theory and application, J.A. Barth Verlag, 1995.
- [2] B. Mihailović, Z. Radosavljević, On a class of tricyclic reflexive cactuses, Univ. Beograd, Publ. Elektrotehn. Fak., Ser. Mat. 16 (2005), 55–63.
- [3] M. Petrović, Z. Radosavljević, Spectrally constrained graphs, Univ. Kragujevac, 2001.
- [4] Z. Radosavljević, B. Mihailović, M. Rašajski, Decomposition of Smith graphs in maximal reflexive cacti, Discrete Math. 308:2-3 (2008), 355–366.
- [5] Z. Radosavljević, B. Mihailović, M. Rašajski: On bicyclic reflexive graphs, Discrete Math. 308:4-5 (2008), 715–725.
- [6] Z. Radosavljević, M. Rašajski, A class of reflexive cactuses with four cycles, Univ. Beograd, Publ. Elektrotehn. Fak., Ser. Mat. 14 (2003), 64–85.
- [7] Z. Radosavljević, M. Rašajski, Multicyclic treelike reflexive graphs. Discrete Math. 296:1 (2005), 43–57.
- [8] M. Rašajski, Z. Radosavljević, B. Mihailović, Maximal reflexive cacti with four cycles: the approach via Smith graphs, Linear Algebra Appl. 435:10 (2011), 2530–2543.