ON THE LAPLACIAN CHARACTERISTIC POLYNOMIALS OF MIXED GRAPHS

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Abstract. Let $G$ be a mixed graph and $L(G)$ be the Laplacian matrix of $G$. In this paper, the coefficients of the Laplacian characteristic polynomial of $G$ are studied. The first derivative of the characteristic polynomial of $L(G)$ is explicitly expressed by means of Laplacian characteristic polynomials of its edge deleted subgraphs. As a consequence, it is shown that the Laplacian characteristic polynomial of a mixed graph is reconstructible from the collection of the Laplacian characteristic polynomials of its edge deleted subgraphs. Then, it is investigated how graph modifications affect the mixed Laplacian characteristic polynomial. Also, a connection between the Laplacian characteristic polynomial of a non-singular connected mixed graph and the signless Laplacian characteristic polynomial is provided, and it is used to establish a lower bound for the spectral radius of $L(G)$. Finally, using Coates digraphs, the perturbation of the mixed Laplacian spectral radius under some graph transformations is discussed.

Key words. Mixed graphs, Laplacian matrix, Laplacian characteristic polynomial, Laplacian spectral radius, Coates digraphs.

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