ON INERTIA AND RATIO TYPE BOUNDS FOR THE k-INDEPENDENCE NUMBER OF A GRAPH AND THEIR RELATIONSHIP

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ABSTRACT. For $k \geq 1$, the k-independence number α_k of a graph is the maximum number of vertices that are mutually at distance greater than k. The well-known inertia and ratio bounds for the (1)-independence number $\alpha(= \alpha_1)$ of a graph, due to Cvetković and Hoffman, respectively, were generalized recently for every value of k. We show that, for graphs with enough regularity, the polynomials involved in such generalizations are closely related and give exact values for α_k, showing a new relationship between the inertia and ratio type bounds. Additionally, we investigate the existence and properties of the extremal case of sets of vertices that are mutually at maximum distance for walk-regular graphs. Finally, we obtain new sharp inertia and ratio type bounds for partially walk-regular graphs by using the predistance polynomials.

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