THE SLATER AND SUB-$k$-DOMINATION NUMBER OF A GRAPH WITH APPLICATIONS TO DOMINATION AND $k$-DOMINATION

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Abstract

In this paper we introduce and study a new graph invariant derived from the degree sequence of a graph $G$, called the sub-$k$-domination number and denoted $\text{sub}_k(G)$. This invariant serves as a generalization of the Slater number; in particular, we show that $\text{sub}_k(G)$ is a computationally efficient sharp lower bound on the $k$-domination number of $G$, and improves on several known lower bounds. We also characterize the sub-$k$-domination numbers of several families of graphs, provide structural results on sub-$k$-domination, and explore properties of graphs which are $\text{sub}_k(G)$-critical with respect to addition and deletion of vertices and edges.

Keywords: Slater number, domination number, sub-$k$-domination number, $k$-domination number, degree sequence index strategy.

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