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THE k-RAINBOW BONDAGE NUMBER OF A DIGRAPH

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Abstract

Let $D = (V, A)$ be a finite and simple digraph. A *k-rainbow dominating function* (kRDF) of a digraph D is a function f from the vertex set V to the set of all subsets of the set $\{1, 2, \ldots, k\}$ such that for any vertex $v \in V$ with $f(v) = \emptyset$ the condition $\bigcup_{u \in N^-(v)} f(u) = \{1, 2, \ldots, k\}$ is fulfilled, where $N^-(v)$ is the set of in-neighbors of v. The *weight* of a kRDF f is the value $\omega(f) = \sum_{v \in V} |f(v)|$. The *$k$-rainbow domination number* of a digraph D, denoted by $\gamma_{rk}(D)$, is the minimum weight of a kRDF of D. The *k-rainbow bondage number* $b_{rk}(D)$ of a digraph D with maximum in-degree at least two, is the minimum cardinality of all sets $A' \subseteq A$ for which $\gamma_{rk}(D-A') > \gamma_{rk}(D)$. In this paper, we establish some bounds for the k-rainbow bondage number and determine the k-rainbow bondage number of several classes of digraphs.

Keywords: k-rainbow dominating function, k-rainbow domination number, k-rainbow bondage number, digraph.

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