BOUNDS ON THE LOCATING-TOTAL DOMINATION NUMBER IN TREES

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Abstract

Given a graph $G = (V, E)$ with no isolated vertex, a subset $S$ of $V$ is called a total dominating set of $G$ if every vertex in $V$ has a neighbor in $S$. A total dominating set $S$ is called a locating-total dominating set if for each pair of distinct vertices $u$ and $v$ in $V \setminus S$, $N(u) \cap S \neq N(v) \cap S$. The minimum cardinality of a locating-total dominating set of $G$ is the locating-total domination number, denoted by $\gamma_{Lt}(G)$. We show that, for a tree $T$ of order $n \geq 3$ and diameter $d$, \( \frac{d+1}{2} \leq \gamma_{Lt}(T) \leq n - \frac{d-1}{2} \), and if $T$ has $l$ leaves, $s$ support vertices and $s_1$ strong support vertices, then $\gamma_{Lt}(T) \geq \max \left\{ \frac{n+l-s+1}{2}, \frac{2(n+1)+3(l-s)-s_1}{5} \right\}$. We also characterize the extremal trees achieving these bounds.

Keywords: tree, total dominating set, locating-total dominating set, locating-total domination number.

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