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VARIOUS BOUNDS FOR LIAR'S DOMINATION NUMBER

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Abstract

Let $G = (V, E)$ be a graph. A set $S \subseteq V$ is a dominating set if $\bigcup_{v \in S} N[v] = V$, where $N[v]$ is the closed neighborhood of v. Let $L \subseteq V$ be a dominating set, and let v be a designated vertex in V (an intruder vertex). Each vertex in $L \cap N[v]$ can report that v is the location of the intruder, but (at most) one $x \in L \cap N[v]$ can report any $w \in N[x]$ as the intruder location or x can indicate that there is no intruder in $N[x]$. A dominating set L is called a liar's dominating set if every $v \in V(G)$ can be correctly identified as an intruder location under these restrictions. The minimum cardinality of a liar's dominating set is called the liar's domination number, and is denoted by $\gamma_{LR}(G)$. In this paper, we present sharp bounds for the liar's domination number in terms of the diameter, the girth and clique covering number of a graph. We present two Nordhaus-Gaddum type relations for $\gamma_{LR}(G)$, and study liar's dominating set sensitivity versus edge-connectivity. We also present various bounds for the liar's domination component number, that is, the maximum number of components over all minimum liar's dominating sets.

Keywords: liar's domination, diameter, regular graph, Nordhaus-Gaddum.
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