

ON GRUNDY TOTAL DOMINATION NUMBER IN PRODUCT GRAPHS

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Abstract

A longest sequence (v_1, \dots, v_k) of vertices of a graph G is a Grundy total dominating sequence of G if for all i , $N(v_i) \setminus \bigcup_{j=1}^{i-1} N(v_j) \neq \emptyset$. The length k of the sequence is called the Grundy total domination number of G and denoted $\gamma_{gr}^t(G)$. In this paper, the Grundy total domination number is studied on four standard graph products. For the direct product we show that $\gamma_{gr}^t(G \times H) \geq \gamma_{gr}^t(G)\gamma_{gr}^t(H)$, conjecture that the equality always holds, and prove the conjecture in several special cases. For the lexicographic product we express $\gamma_{gr}^t(G \circ H)$ in terms of related invariant of the factors and find some explicit formulas for it. For the strong product, lower bounds on $\gamma_{gr}^t(G \boxtimes H)$ are proved as well as upper bounds for products of paths and cycles. For the Cartesian product we prove lower and upper bounds on the Grundy total domination number when factors are paths or cycles.

Keywords: total domination, Grundy total domination number, graph product.

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