Mathematics > Combinatorics

Computing global offensive alliances in Cartesian product graphs

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A global offensive alliance in a graph G is a set S of vertices with the property that every vertex not belonging to S has at least one more neighbor in S than it has outside of S. The global offensive alliance number of G, $\gamma_o(G)$, is the minimum cardinality of a global offensive alliance in G. A set S of vertices of a graph G is a dominating set for G if every vertex not belonging to S has at least one neighbor in S. The domination number of G, $\gamma(G)$, is the minimum cardinality of a dominating set of G. In this work we obtain closed formulas for the global offensive alliance number of several families of Cartesian product graphs, we also prove that $\gamma_o(G\square H)\ge \frac{\gamma(G)\gamma_o(H)}{2}$ for any graphs G and H and we show that if G has an efficient dominating set, then $\gamma_o(G\square H)\ge \gamma(G) \gamma_o(H).$ Moreover, we present a Vizing-like conjecture for the global offensive alliance number and we prove it for several families of graphs.

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