

On Domination Number of Cayley Graphs

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A *dominating* set of a graph Γ is a subset D of V , such that every vertex not in D is adjacent to at least one member of D . The *domination number* $\gamma(\Gamma)$ is the minimum cardinality of a dominating set for Γ . The problem of determining the minimum number of queens that can be placed on a chessboard so that all squares are either attacked by a queen or are occupied by a queen is considered as the origin of the study of dominating sets in graphs. Concept of the domination number is defined for the first time - although with the name "coefficient of external stability"- in Berge's graph theory book from 1962. There are over two thousand academic papers and several books on the topic since then.

Let G denote a finite group with identity 1 and let S denote an inverse-closed subset of $G \setminus \{1\}$. The Cayley graph $\text{Cay}(G; S)$ of the group G with respect to the connection set S is the graph with vertex-set G , in which $g \in G$ is adjacent with $h \in G$ if and only if $h = gs$ for some $s \in S$. The definition of Cayley graph was introduced by A. Cayley in 1878. It is related to many practical problems, and also to some classical problems in pure mathematics. Since finding the domination number is NP-complete for arbitrary graphs, it is natural to ask for bounds on the domination number related to other graph parameters, and also to ask for exact results on specific graph classes. Here we will focus on Cayley graphs. There are limited results on the domination number and finding efficient dominating sets on Cayley graphs on certain groups for certain connection sets. Here, we carry these investigations further and also study different types of dominations. Results given in this talk is due to joint works with Cafer Caliskan and Stefko Miklavic, carried under the TUBITAK - ARRS bilateral project with project number 115F586.