

# DOMINATION NUMBER OF THE COMMUTING GRAPH AND THE NUMBER OF CENTRALIZERS OF A FINITE GROUP

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## Abstract

Let  $G$  be a finite non-abelian group. The *proper commuting graph* of a group  $G$ , is a simple graph whose vertex set is the non-central element of group  $G$ , where two distinct vertices  $x$  and  $y$  are adjacent if and only if  $xy = yx$ . In this paper, we study lower and upper bounds of the domination number of the proper commuting graph of a non-abelian group. We determine the domination number of the proper commuting graph of a nilpotent group  $G$  in term of the domination number of the proper commuting graph of Sylow  $p$ -subgroups of group  $G$ . For some specific class of  $p$ -groups, we compute the exact domination number of the proper commuting graph. Additionally, we prove the proper commuting graph of any non-abelian group  $G$  has a total dominating set if and only if  $G$  is not isomorphic to a generalized dihedral group.

**Key words:** Proper commuting graph; Domination number; Total domination number; Group.