ON VARIOUS TYPES OF PROPER SECONDARY DOMINATING SETS

Paweł Bednarz, Adrian Michalski and Mateusz Pirga

Rzeszow University of Technology

e-mail: pbednarz@prz.edu.pl, a.michalski@prz.edu.pl, m.pirga@prz.edu.pl

Let $k \geq 1$ be an integer. A subset $D \subset V(G)$ is (1,k)-dominating if for every vertex $v \in V(G) \setminus D$ there are $u, w \in D$ such that $uv \in E(G)$ and $d_G(v, w) \leq k$. If $k = 1$ then we obtain the definition of (1,1)-dominating sets, which are also known as 2-dominating sets. If $k = 2$ then we have the concept of (1,2)-dominating sets, see [1].

In [2] Michalski et. al introduced the concept of proper (1,2)-dominating sets to distinguish (1,2)-dominating sets from (1,1)-dominating sets. A *proper* (1,2)*-dominating set* is a (1,2)-dominating set that is not (1,1)-dominating. Basing on this idea, Bednarz and Pirga in [3] defined proper 2-dominating sets i.e. 2-dominating sets which are not 3-dominating.

In this talk we present some results concerning proper (1,2)-dominating sets and proper 2-dominating sets, in particular we focus on the problem of their existence. Moreover, we show relations between parameters of these types of domination.

References

[1] S.M. Hedetniemi, S.T. Hedetniemi, J. Knisely, D.F. Rall, *Secondary domination in graphs*, AKCE International Journal of Graphs and Combinatorics, 5, (2008), 103–115.

[2] A. Michalski, I. Włoch, M. Dettlaff, M. Lemańska, *On proper (1,2)-dominating sets*, Mathematical Methods in the Applied Sciences, 45(11), (2022), 7050–7057.

[3] P. Bednarz, M. Pirga, *On proper 2-dominating sets in graphs*, Symmetry, 16, (2024), 296.