

GRAPHS WITH LARGE SEMIPAIED DOMINATION NUMBER

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Abstract

Let G be a graph with vertex set V and no isolated vertices. A subset $S \subseteq V$ is a semipaied dominating set of G if every vertex in $V \setminus S$ is adjacent to a vertex in S and S can be partitioned into two element subsets such that the vertices in each subset are at most distance two apart. The semipaied domination number $\gamma_{\text{pr2}}(G)$ is the minimum cardinality of a semipaied dominating set of G . We show that if G is a connected graph G of order $n \geq 3$, then $\gamma_{\text{pr2}}(G) \leq \frac{2}{3}n$, and we characterize the extremal graphs achieving equality in the bound.

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REFERENCES

- [1] W.J. Desormeaux and M.A. Henning, *Paired domination in graphs: A survey and recent results*, Util. Math. **94** (2014) 101–166.

- [2] W. Goddard, M.A. Henning and C.A. McPillan, *Semitotal domination in graphs*, Util. Math. **94** (2014) 67–81.
- [3] T.W. Haynes, S.T. Hedetniemi and P.J. Slater, *Fundamentals of Domination in Graphs* (Marcel Dekker, Inc., New York, 1998).
- [4] T.W. Haynes, S.T. Hedetniemi and P.J. Slater, *Domination in Graphs: Advanced Topics* (Marcel Dekker, Inc. New York, 1998).
- [5] T.W. Haynes and M.A. Henning, *Semipaired domination in graphs*, J. Combin. Math. Combin. Comput. **104** (2018) 93–109.
- [6] T.W. Haynes and P.J. Slater, *Paired-domination and the paired-domatic-number*, Congr. Numer. **109** (1995) 65–72.
- [7] T.W. Haynes and P.J. Slater, *Paired domination in graphs* Networks **32** (1998) 199–206.
doi:10.1002/(SICI)1097-0037(199810)32:3<199::AID-NET4>3.0.CO;2-F
- [8] M.A. Henning, *Graphs with large paired-domination number*, J. Comb. Optim. **13** (2007) 61–78.
doi:10.1007/s10878-006-9014-8
- [9] M.A. Henning, *Edge weighting functions on semitotal dominating sets*, Graphs Combin. **33** (2017) 403–417.
doi:10.1007/s00373-017-1769-4
- [10] M.A. Henning and A.J. Marcon, *On matching and semitotal domination in graphs*, Discrete Math. **324** (2014) 13–18.
doi:10.1016/j.disc.2014.01.021
- [11] M.A. Henning and A.J. Marcon, *Vertices contained in all or in no minimum semitotal dominating set of a tree*, Discuss. Math. Graph Theory **36** (2016) 71–93.
doi:10.7151/dmgt.1844
- [12] M.A. Henning and A.J. Marcon, *Semitotal domination in claw-free cubic graphs*, Ann. Comb. **20** (2016) 799–813.
doi:10.1007/s00026-016-0331-z
- [13] M.A. Henning and A. Yeo, *Total Domination in Graphs* (Springer Monographs in Mathematics, 2013)
doi:10.1007/978-1-4614-6525-6
- [14] S. Huang and E. Shan, *A note on the upper bound for the paired-domination number of a graph with minimum degree at least two*, Networks **57** (2011) 115–116.
doi:10.1002/net.20390

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