Full PDF DMGT Page

FAIR DOMINATION NUMBER IN CACTUS GRAPHS

Majid Hajian

Department of Mathematics Shahrood University of Technology Shahrood, Iran

AND

NADER JAFARI RAD

Department of Mathematics Shahed University, Tehran, Iran

e-mail: n.jafarirad@gmail.com

Abstract

For $k \geq 1$, a k-fair dominating set (or just kFD-set) in a graph G is a dominating set S such that $|N(v) \cap S| = k$ for every vertex $v \in V \setminus S$. The k-fair domination number of G, denoted by $fd_k(G)$, is the minimum cardinality of a kFD-set. A fair dominating set, abbreviated FD-set, is a kFD-set for some integer $k \geq 1$. The fair domination number, denoted by fd(G), of G that is not the empty graph, is the minimum cardinality of an FD-set in G. In this paper, aiming to provide a particular answer to a problem posed in [Y. Caro, A. Hansberg and M.A. Henning, *Fair domination* in graphs, Discrete Math. 312 (2012) 2905–2914], we present a new upper bound for the fair domination number of a cactus graph, and characterize all cactus graphs G achieving equality in the upper bound of $fd_1(G)$.

Keywords: fair domination, cactus graph, unicyclic graph.

2010 Mathematics Subject Classification: 05C69.

References

- Y. Caro, A. Hansberg and M.A. Henning, *Fair domination in graphs*, Discrete Math. **312** (2012) 2905–2914. doi:10.1016/j.disc.2012.05.006
- [2] B. Chaluvaraju, M. Chellali and K.A. Vidya, *Perfect k-domination in graphs*, Australas. J. Combin. 48 (2010) 175–184.

- [3] B. Chaluvaraju and K.A. Vidya, Perfect dominating set graph of a graph G, Adv. Appl. Discrete Math. 2 (2008) 49–57.
- [4] E.J. Cockayne, B.L. Hartnell, S.T. Hedetniemi and R. Laskar, *Perfect domination in graphs*, J. Comb. Inf. Syst. Sci. 18 (1993) 136–148.
- [5] I.J. Dejter, Perfect domination in regular grid graphs, Australas. J. Combin. 42 (2008) 99–114.
- [6] I.J. Dejter and A.A. Delgado, Perfect domination in rectangular grid graphs, J. Combin. Math. Combin. Comput. 70 (2009) 177–196.
- [7] M.R. Fellows and M.N. Hoover, *Perfect domination*, Australas. J. Combin. 3 (1991) 141–150.
- [8] M. Hajian and N. Jafari Rad, *Trees and unicyclic graphs with large fair domination number*, Util. Math. accepted.
- [9] H. Hatami and P. Hatami, Perfect dominating sets in the Cartesian products of prime cycles, Electron. J. Combin. 14 (2007) #N8.
- [10] T.W. Haynes, S.T. Hedetniemi and P.J. Slater, Fundamentals of Domination in Graphs (Marcel Dekker Inc., New York, 1998).

Received 4 May 2017 Revised 5 September 2017 Accepted 19 September 2017