Discussiones Mathematicae
Graph Theory 36 (2016) 661–668
doi:10.7151/dmgt.1880

SOME VARIATIONS OF PERFECT GRAPHS

Magda Dettlaff, Magdalena Lemańska

Faculty of Applied Physics and Mathematics
Gdańsk University of Technology
ul. Narutowicza 11/12, 80–233 Gdańsk, Poland

e-mail: mdettlaff,magda@pg.gda.pl

Gabriel Semanišin

Institute of Computer Science
P.J. Šafárik University
Jesenná 5, 041 54 Košice, Slovakia

e-mail: gabriel.semanisin@upjs.sk

and

Rita Zuazua

Faculty of Science
National Autonomous University of Mexico
Av. Universidad 3000, Mexico City, Mexico

e-mail: ritazuazua@ciencias.unam.mx

Abstract

We consider $(\psi_k - \gamma_{k-1})$-perfect graphs, i.e., graphs G for which $\psi_k(H) = \gamma_{k-1}(H)$ for any induced subgraph H of G, where ψ_k and γ_{k-1} are the k-path vertex cover number and the distance $(k-1)$-domination number, respectively. We study $(\psi_k - \gamma_{k-1})$-perfect paths, cycles and complete graphs for $k \geq 2$. Moreover, we provide a complete characterisation of $(\psi_2 - \gamma_1)$-perfect graphs describing the set of its forbidden induced subgraphs and providing the explicit characterisation of the structure of graphs belonging to this family.

Keywords: k-path vertex cover, distance k-domination number, perfect graphs.

2010 Mathematics Subject Classification: 05C69.

References

[1] C. Berge, *Färbung von Graphen, deren samtliche bzw. deren ungerade Kreise starr sind*, Wiss. Z. Martin-Luther-Univ. Halle-Wittenberg Math.-Natur. Reihe **10** (1961) 114.

[2] A. Brandstädt, V.B. Le and J.P. Spinrad, Graph Classes: A Survey (Monographs on Discrete Math. Appl.) (SIAM, Philadelphia, 1999). doi:10.1137/1.9780898719796

[3] B. Brešar, F. Kardoš, J. Katrenič and G. Semanišin, *Minimum k-path vertex cover*, Discrete Appl. Math. **159** (2011) 1189–1195. doi:10.1016/j.dam.2011.04.008

[4] G.S. Domke, J.H. Hattingh and L.R. Markus, *On weakly connected domination in graphs* II, Discrete Math. **305** (2005) 112–122. doi:10.1016/j.disc.2005.10.006

[5] T. Haynes, S. Hedetniemi and P. Slater, Fundamentals of Domination in Graphs (Marcel Dekker, 1998).

[6] M.A. Henning, O.R. Oellermann and H.C. Swart, *Bounds on distance domination parameters*, J. Combin. Inform. System Sci. **16** (1991) 11–18.

[7] M.A. Henning, O.R. Oellermann and H.C. Swart, *Relationships between distance domination parameters*, Math. Pannon. **5** (1994) 69–79.

[8] L. Volkmann, *On graphs with equal domination and covering numbers*, Discrete Appl. Math. **51** (1994) 211–217. doi:10.1016/0166-218X(94)90110-4

[9] I.E. Zverovich, *Perfect-connected-dominant graphs*, Discuss. Math. Graph Theory **23** (2003) 159–162. doi:10.7151/dmgt.1192

Received 3 March 2015
Revised 23 September 2015
Accepted 9 October 2015