INTERVAL INCIDENCE COLORING OF SUBCUBIC GRAPHS¹

ANNA MAŁAFIEJSKA

*Department of Probability Theory and Biomathematics
Faculty of Physics and Applied Mathematics
Gdańsk University of Technology, Narutowicza 11/12, Gdańsk, Poland*
e-mail: anna@animima.org

AND

MICHAŁ MAŁAFIEJSKI

*Department of Algorithms and System Modeling
Faculty of Electronics, Telecommunications and Informatics
Gdańsk University of Technology, Narutowicza 11/12, Gdańsk, Poland*
e-mail: michal@animima.org

Abstract

In this paper we study the problem of interval incidence coloring of subcubic graphs. In [14] the authors proved that the interval incidence 4-coloring problem is polynomially solvable and the interval incidence 5-coloring problem is $\mathcal{NP}$ -complete, and they asked if $\chi_{ii}(G) \leq 2\Delta(G)$ holds for an arbitrary graph G . In this paper, we prove that an interval incidence 6-coloring always exists for any subcubic graph G with $\Delta(G) = 3$.

Keywords: interval incidence coloring, incidence coloring, subcubic graph.

2010 Mathematics Subject Classification: 05C15, 05C85, 05C69.

REFERENCES

- [1] N. Alon, C. McDiarmid and B. Reed, *Star arboricity*, *Combinatorica* **12** (1992) 375–380.
doi:10.1007/BF01305230

¹This project has been partially supported by Narodowe Centrum Nauki under contract DEC-2011/02/A/ST6/00201.

- [2] A. Asratian and R. Kamalian, *Investigation on interval edge-colorings of graphs*, J. Combin. Theory Ser. B **62** (1994) 34–43.
doi:10.1006/jctb.1994.1053
- [3] R.A. Brualdi and J.Q. Massey, *Incidence and strong edge colorings of graphs*, Discrete Math. **122** (1993) 51–58.
doi:10.1016/0012-365X(93)90286-3
- [4] M. Hosseini Dolama, E. Sopena and X. Zhu, *Incidence coloring of k -degenerated graphs*, Discrete Math. **283** (2004) 121–128.
doi:10.1016/j.disc.2004.01.015
- [5] M. Hosseini Dolama and E. Sopena, *On the maximum average degree and the incidence chromatic number of a graph*, Discrete Math. Theor. Comput. Sci. **7** (2005) 203–216.
- [6] K. Giaro, *Interval edge-coloring*, in: Graph Colorings, Contemporary Mathematics AMS, M. Kubale Ed. (2004) 105–121.
doi:10.1090/conm/352/08
- [7] K. Giaro, M. Kubale and M. Małafiejski, *Compact scheduling in open shop with zero-one time operations*, INFOR Inf. Syst. Oper. Res. **37** (1999) 37–47.
doi:10.1080/03155986.1999.11732367
- [8] K. Giaro, M. Kubale and M. Małafiejski, *Consecutive colorings of the edges of general graphs*, Discrete Math. **236** (2001) 131–143.
doi:10.1016/S0012-365X(00)00437-4
- [9] B. Guiduli, *On incidence coloring and star arboricity of graphs*, Discrete Math. **163** (1997) 275–278.
doi:10.1016/0012-365X(95)00342-T
- [10] P. Hall, *On representatives of subsets*, J. London Math. Soc. **10** (1935) 26–30.
- [11] R. Janczewski, A. Małafiejska and M. Małafiejski, *Interval incidence coloring of graphs*, Zesz. Nauk. Pol. Gd. **13** (2007) 481–488, in Polish.
- [12] R. Janczewski, A. Małafiejska and M. Małafiejski, *Interval wavelength assignment in all-optical star networks*, in: PPAM 2009 (Springer Verlag, 2010) Lecture Notes in Comput. Sci. **6067** (2010) 11–20.
doi:10.1007/978-3-642-14390-8_2
- [13] R. Janczewski, A. Małafiejska and M. Małafiejski, *Interval incidence coloring of bipartite graphs*, Discrete Math. **166** (2014) 131–140.
doi:10.1016/j.dam.2013.10.007
- [14] R. Janczewski, A. Małafiejska and M. Małafiejski, *Interval incidence graph coloring*, Discrete Math. **182** (2015) 73–83.
doi:10.1016/j.dam.2014.03.006
- [15] R. Janczewski, A. Małafiejska and M. Małafiejski, *On incidence coloring of complete multipartite and semicubic bipartite graphs*, Discuss. Math. Graph Theory (2017), in press.

- [16] X. Li and J. Tu, *NP-completeness of 4-incidence colorability of semi-cubic graphs*, Discrete Math. **308** (2008) 1334–1340.
doi:10.1016/j.disc.2007.03.076
- [17] M. Maydanskiy, *The incidence coloring conjecture for graphs of maximum degree three*, Discrete Math. **292** (2005) 131–141.
doi:10.1016/j.disc.2005.02.003
- [18] A.C. Shiau, T.-H. Shiau and Y.-L. Wang, *Incidence coloring of Cartesian product graphs*, Inform. Process. Lett. **115** (2015) 765–768.
doi:10.1016/j.ipl.2015.05.002
- [19] W.C. Shiu and P.K. Sun, *Invalid proofs on incidence coloring*, Discrete Math. **308** (2008) 6575–6580.
doi:10.1016/j.disc.2007.11.030

Received 9 February 2016

Revised 12 January 2017

Accepted 12 January 2017