STRONG EDGE-COLORING OF PLANAR GRAPHS

WEN-YAO SONG AND LIAN-YING MIAO

*College of Science
China University of Mining and Technology
Xuzhou 221116, P.R. China*

e-mail: songwenyao0216@126.com
miaolianying@cumt.edu.cn

Abstract

A *strong edge-coloring* of a graph is a proper edge-coloring where each color class induces a matching. We denote by $\chi'_s(G)$ the *strong chromatic index* of G which is the smallest integer k such that G can be strongly edge-colored with k colors. It is known that every planar graph G has a strong edge-coloring with at most $4\Delta(G) + 4$ colors [R.J. Faudree, A. Gyárfás, R.H. Schelp and Zs. Tuza, *The strong chromatic index of graphs*, Ars Combin. **29B** (1990) 205–211]. In this paper, we show that if G is a planar graph with $g \geq 5$, then $\chi'_s(G) \leq 4\Delta(G) - 2$ when $\Delta(G) \geq 6$ and $\chi'_s(G) \leq 19$ when $\Delta(G) = 5$, where g is the girth of G .

Keywords: strong edge-coloring, strong chromatic index, planar graph, discharging method.

2010 Mathematics Subject Classification: 05C15.

REFERENCES

- [1] L.D. Andersen, *The strong chromatic index of a cubic graph is at most 10*, Discrete Math. **108** (1992) 231–252.
doi:10.1016/0012-365X(92)90678-9
- [2] J. Bensmail, A. Harutyunyan, H. Hocquard and P. Valicov, *Strong edge-colouring of sparse planar graphs*, Discrete Appl. Math. **179** (2014) 229–234.
doi:10.1016/j.dam.2014.07.006
- [3] J.A. Bondy and U.S.R. Murty, *Graph Theory with Applications* (North-Holland, New York-Amsterdam-Oxford, 1982).
- [4] H. Bruhn and F. Joos, *A stronger bound for the strong chromatic index*, Electron. Notes Discrete Math. **49** (2015) 277–284.
doi:10.1016/j.endm.2015.06.038

- [5] P. Erdős, *Problems and results in combinatorial analysis and graph theory*, Discrete Math. **72** (1988) 81–92.
doi:10.1016/0012-365X(88)90196-3
- [6] R.J. Faudree, A. Gyárfás, R.H. Schelp and Zs. Tuza, *The strong chromatic index of graphs*, Ars Combin. **29B** (1990) 205–211.
- [7] J.L. Fouquet and J.L. Jolivet, *Strong edge-colorings of graphs and applications to multi- k -gons*, Ars Combin. **16A** (1983) 141–150.
- [8] J.L. Fouquet and J.L. Jolivet, *Strong edge-coloring of cubic planar graphs*, Progress in Graph Theory **111** (1984) 247–264.
- [9] P. Horák, H. Qing and W.T. Trotter, *Induced matchings in cubic graphs*, J. Graph Theory **17** (1993) 151–160.
doi:10.1002/jgt.3190170204
- [10] H. Hudák, B. Lužar, R. Soták and R. Škrekovski, *Strong edge-coloring of planar graphs*, Discrete Math. **324** (2014) 41–49.
doi:10.1016/j.disc.2014.02.002

Received 16 August 2015

Revised 28 June 2016

Accepted 30 June 2016