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A note on the neighbor sum distinguishing total coloring of planar graphs. (English)

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Summary: Let $G = (V(G), E(G))$ be a graph and ϕ be a proper total k -coloring of G . Let $f(v)$ denote the sum of the color on a vertex v and colors on all the edges incident with v . ϕ is neighbor sum distinguishing if $f(u) \neq f(v)$ for each edge $uv \in E(G)$. The smallest integer k for which such a coloring of G exists is the neighbor sum distinguishing total chromatic number and denoted by $\chi''_{\Sigma}(G)$. *M. Pilśniak* and *M. Woźniak* [Graphs Comb. 31, No. 3, 771–782 (2015; Zbl 1312.05054)] conjectured that for any simple graph with maximum degree $\Delta(G)$, $\chi''_{\Sigma}(G) \leq \Delta(G) + 3$. It is known that for any simple planar graph, $\chi''_{\Sigma}(G) \leq \max\{\Delta(G) + 3, 14\}$ and $\chi''_{\Sigma}(G) \leq \max\{\Delta(G) + 2, 16\}$. In this paper, by using the famous Combinatorial Nullstellensatz, we show that for any simple planar graph, $\chi''_{\Sigma}(G) \leq \max\{\Delta(G) + 2, 14\}$. The bound $\Delta(G) + 2$ is sharp.

MSC:

05C15 Coloring of graphs and hypergraphs

05C10 Planar graphs; geometric and topological aspects of graph theory

Cited in 9 Documents

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References:

- [1] Alon, N., Combinatorial nullstellensatz, *Combin. Probab. Comput.*, 8, 7-29, (1999) · Zbl 0920.05026
- [2] Bondy, J.; Murty, U., *Graph theory with applications*, (1976), North-Holland New York · Zbl 1226.05083
- [3] Cheng, X.; Huang, D.; Wang, G., Neighbor sum distinguishing total colorings of planar graphs with maximum degree δ , *Discrete Appl. Math.*, 190, 34-41, (2015) · Zbl 1316.05041
- [4] Ding, L.; Wang, G.; Yan, G., Neighbor sum distinguishing total colorings via the combinatorial nullstellensatz, *Sci. China Math.*, 57, 9, 1875-1882, (2014) · Zbl 1303.05058
- [5] Li, H.; Ding, L.; Liu, B., Neighbor sum distinguishing total colorings of planar graphs, *J. Comb. Optim.*, 30, 3, 675-688, (2015) · Zbl 1325.05083
- [6] Li, H.; Liu, B.; Wang, G., Neighbor sum distinguishing total colorings of K_4 -minor free graphs, *Front. Math. China*, 8, 6, 1351-1366, (2013) · Zbl 1306.05066
- [7] Pilśniak, M.; Woźniak, M., On the adjacent-vertex-distinguishing index by sums in total proper colorings, *Graphs Combin.*, (2013)
- [8] Przybyło, J., Neighbour sum distinguishing total colorings via the combinatorial nullstellensatz, *Discrete Appl. Math.*, 202, 163-173, (2016) · Zbl 1330.05074
- [9] Qu, C.; Wang, G.; Wu, J., On the neighbor sum distinguishing total coloring of planar graphs, *Theoret. Comput. Sci.*, 609, 162-170, (2016) · Zbl 1331.05084
- [10] Qu, C.; Wang, G.; Yan, G., Neighbor sum distinguishing total choosability of planar graphs, *J. Comb. Optim.*, (2015)
- [11] Wang, J.; Cai, J.; Ma, Q., Neighbor sum distinguishing total choosability of planar graphs without 4-cycles, *Discrete Appl. Math.*, 206, 215-219, (2016) · Zbl 1335.05051
- [12] Wang, J.; Ma, Q.; Han, X., Neighbor sum distinguishing total colorings of triangle free planar graphs, *Acta Math. Sin. (Engl. Ser.)*, 31, 2, 216-224, (2015) · Zbl 1317.05065
- [13] Wang, J.; Ma, Q.; Han, X., A proper total coloring distinguishing adjacent vertices by sums of planar graphs without intersecting triangles, *J. Comb. Optim.*, (2015)
- [14] Yao, J.; Shao, Z.; Xu, C., Neighbor sum distinguishing total choosability of graphs with $\Delta = 3$, *Adv. Math. (China)*, (2014)
- [15] Yao, J.; Yu, X.; Wang, G.; Xu, C., Neighbor sum (set) distinguishing total choosability of d -degenerate graphs, *Graphs Combin.*, (2015)

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