Injective coloring of planar graphs

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Abstract

The injective coloring of a graph $G$ is a mapping $c : V(G) \rightarrow \{1, 2, \ldots, k\}$ such that $c(u) \neq c(v)$ for every $u, v \in V(G)$ that have a common neighbor. The least $k$ such that $G$ is injectively colored is the injective chromatic number of $G$, denoted by $\chi_i(G)$. The concepts of the injective coloring and the injective chromatic number were introduced by Hahn, Kratochvíl, Širáň and Sotteau [1] in 2002. They obtained general upper and lower bounds. Namely, they proved that $\Delta \leq \chi_i(G) \leq \Delta^2 - \Delta + 1$, where $\Delta$ denotes the maximum degree of the graph $G$, and characterized the graphs for which the lower or the upper bound is achieved in the inequalities.

Here, we consider injective coloring of planar graphs. Lužar, Škrekovski, and Tancer [2] have proved that every subcubic planar graph of girth at least 7 is 5-colorable. We extend this result to higher degree graphs by showing that every planar graph of maximum degree $\Delta$ and with girth at least 7 is injectively $(\Delta + 2)$-colorable.

This is joint work with Borut Lužar and Riste Škrekovski.

References
