List 3-dynamic coloring of graphs with small maximum average degree

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ABSTRACT

An $r$-dynamic $k$-coloring of a graph $G$ is a proper $k$-coloring $\phi$ such that for any vertex $v$, $v$ has at least $\min\{r, \deg_G(v)\}$ distinct colors in $N_G(v)$. The $r$-dynamic chromatic number $\chi^d_r(G)$ of a graph $G$ is the least $k$ such that there exists an $r$-dynamic $k$-coloring of $G$. The list $r$-dynamic chromatic number of a graph $G$ is denoted by $\text{ch}^d_r(G)$. Recently, Loeb, Mahoney, Reiniger, and Wise showed that the list 3-dynamic chromatic number of a planar graph is at most 10. And Cheng, Lai, Lorenzen, Luo, Thompson, and Zhang studied the maximum average degree condition to have $\chi^d_r(G) \leq 4$, 5, or 6.

In this paper, we study list 3-dynamic coloring in terms of maximum average degree. We show that $\text{ch}^d_3(G) \leq 6$ if $\text{mad}(G) < \frac{15}{7}$, and $\text{ch}^d_3(G) \leq 7$ if $\text{mad}(G) < \frac{14}{5}$, and both of the bounds are tight. This is joint work with Boram Park.