The distinguishing chromatic numbers of triangulations on the projective plane

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A simple graph $G$ is $d$-distinguishing colorable if there exists a vertex coloring $c : V(G) \rightarrow \{1, 2, \ldots, d\}$ such that no automorphism, other than the identity map $id_G$, preserves the vertex coloring $c$. It is trivial that any graph $G$ is $|V(G)|$-distinguishing colorable. We shall define the distinguishing chromatic number of $G$ as the minimum value $d$ such that $G$ is $d$-distingiuishing colorable, and denote it by $\chi_D(G)$. It is a natural question whether there exists an upper bound for the distinguishing chromatic numbers of planar graphs. However, the answer is “No” in general since $\chi_D(K_{1,t}) = 1 + t$ for any star graph $K_{1,t}$ and $\chi_D(K_{2,t}) = 2 + t$ for any complete bipartite graph $K_{2,t}$. Negami has established a positive answer to the question for 3-connected planar graphs, which states that every 3-connected planar graph is 6-distinguishing colorable. In our talk, we shall prove that every triangulation on the projective plane is 7-distinguishing colorable.

Keywords: distinguishing chromatic number, triangulations, projective plane