

Disjoint Correspondence Colorings for K_5 -Minor-free Graphs

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Thomassen famously proved that every planar graph is 5-choosable. We explore variants of this result, focusing on finding disjoint correspondence colorings, in the more general class of K_5 -minor-free graphs.

Correspondence colorings generalize list colorings as follows. Given a graph G and a positive integer t , a correspondence t -cover M assigns to each $v \in V(G)$ a set of allowable colors $\{1_v, \dots, t_v\}$ and to each edge $vw \in E(G)$ a matching between $\{1_v, \dots, t_v\}$ and $\{1_w, \dots, t_w\}$. An M -coloring φ picks for each vertex v a color $\varphi(v)$ (from the set $\{1_v, \dots, t_v\}$) such that for each edge $vw \in E(G)$ the colors $\varphi(v), \varphi(w)$ are not matched to each other. Two M -colorings φ_1, φ_2 of G are *disjoint* if $\varphi_1(v) \neq \varphi_2(v)$ for all $v \in V(G)$.

For every K_5 -minor-free graph G and every correspondence 6-cover M of G , we construct 3 pairwise disjoint M -colorings $\varphi_1, \varphi_2, \varphi_3$. In contrast, we provide examples of K_5 -minor-free graphs and correspondence 5-covers M that do not admit 3 disjoint M -colorings.