Disjoint correspondence colorings for K_5-minor-free graphs

František Kardoš

(joint work with Wouter Cames van Batenburg and Daniel W. Cranston)

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 $\mathbf{M}$ assigns to each $v \in V(G)$ a set of allowable colors $\{1_v, \ldots, t_v\}$ and to each edge $vw \in E(G)$ a matching between $\{1_v, \ldots, t_v\}$ and $\{1_w, \ldots, t_w\}$. An $\mathbf{M}$-coloring φ picks for each vertex v a color $\varphi(v)$ (from the set $\{1_v, \ldots, t_v\}$) such that for each edge $vw \in E(G)$ the colors $\varphi(v), \varphi(w)$ are not matched to each other. Two $\mathbf{M}$-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 $\mathbf{M}$ of G, we construct 3 pairwise disjoint $\mathbf{M}$-colorings $\varphi_1, \varphi_2, \varphi_3$. In contrast, we provide examples of K_5-minor-free graphs and correspondence 5-covers $\mathbf{M}$ that do not admit 3 disjoint $\mathbf{M}$-colorings.