Guangzhou Discrete Mathematics Seminar

Every subcubic graph is packing $(1, 1, 2, 2, 3)$-colorable

Xujun Liu

Xi'an Jiaotong-Liverpool University, Suzhou, China

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For a sequence $S = (s_1, \ldots, s_k)$ of non-decreasing positive integers, a packing S-coloring of a graph G is a partition of its vertex set $V(G)$ into $V_1, \ldots, V_k$ such that for every pair of distinct vertices $u, v \in V_i$ the distance between u and v is at least $s_i + 1$, where $1 \leq i \leq k$. The packing chromatic number, $\chi_p(G)$, of a graph G is defined to be the smallest integer k such that G has a packing $(1, 2, \ldots, k)$-coloring. Gastineau and Togni asked an open question "Is it true that the 1-subdivision $(D(G))$ of any subcubic graph G has packing chromatic number at most 5?" and later Brešar, Klavžar, Rall, and Wash conjectured that it is true.

In this paper, we prove that every subcubic graph has a packing $(1, 1, 2, 2, 3)$-coloring and it is sharp due to the existence of subcubic graphs that are not packing $(1, 1, 2, 2)$-colorable. As a corollary of our result, $\chi_p(D(G)) \leq 6$ for every subcubic graph G, improving a previous bound (8) due to Balogh, Kostochka, and Liu in 2019, and we are now just one step away from fully solving the conjecture. Joint work with Xin Zhang and Yanting Zhang.

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