Anti-Ramsey number of disjoint rainbow bases in all matroids

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Abstract

Consider a matroid $M = (E, \mathcal{I})$ with its elements of the ground set E colored. A *rainbow basis* is a maximum independent set in which each element receives a different color. The *rank* of a subset S of E, denoted by $r_M(S)$, is the maximum size of an independent set in S. A *flat* F is a maximal set in M with a fixed rank. The *anti-Ramsey* number of t pairwise disjoint rainbow bases in M, denoted by $ar(M, t)$, is defined as the maximum number of colors m such that there exists an m coloring of the ground set E of M which contains no t pairwise disjoint rainbow bases. We determine $ar(M, t)$ for all matroids of rank at least 2: $ar(M, t) = |E|$ if there exists a flat F_0 with $|E| - |F_0| < t(r_M(E) - r_M(F_0))$; and $ar(M, t) = \max_{F: r_M(F) \le r_M(E)-2}\{|F| + t(r_M(E) - r_M(F) - 1)\}$ otherwise. This generalizes Lu-Meier-Wang's previous result on the anti-Ramsey number of edge-disjoint rainbow spanning trees in any multigraph G.

This is joint work with Linyuan Lu.

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