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Packing nearly optimal $R(3, t)$ graphs

In a celebrated paper from 1995, Kim proved $R(3, t) \geq ct^2/\log t$ by constructing a triangle-free n -vertex graph with independence number at most $C\sqrt{n \log n}$. We extend this result, by approximately decomposing the complete graph K_n into edge-disjoint copies of such 'nearly Ramsey optimal' graphs. More precisely, for any $\epsilon > 0$ we find a collection $(G_i)_i$ of edge-disjoint triangle-free graphs $G_i \subseteq K_n$ such that (a) each G_i has independence number at most $C_\epsilon \sqrt{n \log n}$, and (b) the union of the G_i contains at least $(1 - \epsilon) \binom{n}{2}$ edges. As an application we prove a conjecture of Fox, Grinsh, Liebenau, Person, and Szabo in Ramsey theory (concerning r -Ramsey-minimal graphs for K_3).

Based on joint work with He Guo.