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Monochromatic coverings in colored complete graphs. (In English)

Combinatorics, graph theory, and computing, Proc. 20th Southeast Conf., Boca Raton/FL (USA) 1989, Congr. Numerantium 71, 29-38 (1990).

[For the entire collection see Zbl 688.00003.]

For given positive integers, t, r and n, and an r-colouring of the edges of K_n (i.e. a partition of K_n into r monochromatic edgedisjoint subgraphs), what is the largest subset B of vertices of K_n necessarily monochromatically covered by some t-element subset of the vertices? (The set A monochromatically covers B if there is a colour c such that for all $b \in B - A$there is an $a \in A$ with (a, b) of colour c.) In the case $r = 2$ it was proved by *P. Erdős*, *J. Faudree*, *A. Gyárfás* and *R. H. Schelp* [J. Graph Theory 13, 713-718 (1989)] that there are at most t vertices which monochromatically cover at least $(1 - 1/2^t)n$ vertices. The present paper gives partial answers for $r \geq 3$. It is proved that for $r = 3$ there exist at most 22 vertices which monochromatically cover at most 22 vertices which monochromatically cover at least $2n/3$ of the vertices. Some evidence is given that perhaps the number 22 can be replaced by 3, which by an example of Kierstead would be the best possible for $r = t = 3$. The example shows that a natural generalization of the $(r = 2)$-case does not hold. However, for t fixed, r fixed and large, and n large with respect to r, the generalization essentially holds.

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