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Some extremal results in cochromatic and dichromatic theory. (In English)

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For a graph G, the cochromatic number of G, denoted $z(G)$, is the least m for which there is a partition of the vertex set of G having order m, where each part induces a complete or empty graph. Given a digraph D, the dichromatic number $d(D)$ of D is the order of the smallest partition of $V(D)$ where each part induces an acyclic digraph. For an undirected graph G, the dichromatic number of G, denoted $d(G)$, is the maximum dichromatic number of all orientations of G. Let m be an integer; by $d(m)$ is denoted the minimum size of all graphs G where $d(G) = m$. In this paper it is proved that if $\{G_n\}$ is a family of graphs such that $z(G_n) = n$, then there is a positive c such that the size of G_n is at least $cn^2 \log^2 n$; also $d(n) = \theta(n^2 \ln^2 n)$ holds. The proof uses R. M. Wilson's asymptotic results about the existence of pairwise balanced designs [J. Comb. Theory, Ser. A 18, 71-79 (1975; Zbl 295.05002)].

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05C80 Random graphs
05C15 Chromatic theory of graphs and maps
05C35 Extremal problems (graph theory)
05C20 Directed graphs (digraphs)

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