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Graphs that are critical for the packing chromatic number. (English) Zbl 07495523
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Summary: Given a graph $G$, a coloring $c : V(G) \to \{1, \ldots, k\}$ such that $c(u) = c(v) = i$ implies that vertices $u$ and $v$ are at distance greater than $i$, is called a packing coloring of $G$. The minimum number of colors in a packing coloring of $G$ is called the packing chromatic number of $G$, and is denoted by $\chi^\rho(G)$. In this paper, we propose the study of $\chi^\rho$-critical graphs, which are the graphs $G$ such that for any proper subgraph $H$ of $G$, $\chi^\rho(H) < \chi^\rho(G)$. We characterize $\chi^\rho$-critical graphs with diameter 2, and $\chi^\rho$-critical block graphs with diameter 3. Furthermore, we characterize $\chi^\rho$-critical graphs with small packing chromatic number, and we also consider $\chi^\rho$-critical trees. In addition, we prove that for any graph $G$ and every edge $e \in E(G)$, we have $(\chi^\rho(G) + 1)/2 \leq \chi^\rho(G - e) \leq \chi^\rho(G)$, and provide a corresponding realization result, which shows that $\chi^\rho(G - e)$ can achieve any of the integers between these bounds.

MSC:
05C15  Coloring of graphs and hypergraphs
05C12  Distance in graphs
05C70  Edge subsets with special properties (factorization, matching, partitioning, covering and packing, etc.)
05C05  Trees

Keywords:
packing coloring; critical graph; diameter; block graph; tree

Full Text: DOI

References:


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