

Decomposition of sparse graphs, with application to game coloring number

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Abstract

Let k be a nonnegative integer, and let $m_k = (4(k+1)(k+3))(k^2+6k+6)$. We prove that every simple graph with maximum average degree less than m_k decomposes into a forest and a subgraph with maximum degree at most k (furthermore, when $k \leq 5$ both subgraphs can be required to be forests). It follows that every simple graph with maximum average degree less than m_k has game coloring number at most $4+k$.