COMPLETELY INDEPENDENT SPANNING TREES IN $k$-TH POWER OF GRAPHS

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Abstract
Let $T_1, T_2, \ldots, T_k$ be spanning trees of a graph $G$. For any two vertices $u, v$ of $G$, if the paths from $u$ to $v$ in these $k$ trees are pairwise openly disjoint, then we say that $T_1, T_2, \ldots, T_k$ are completely independent. Araki showed that the square of a 2-connected graph $G$ on $n$ vertices with $n \geq 4$ has two completely independent spanning trees. In this paper, we prove that the $k$-th power of a $k$-connected graph $G$ on $n$ vertices with $n \geq 2k$ has $k$ completely independent spanning trees. In fact, we prove a stronger result: if $G$ is a connected graph on $n$ vertices with $\delta(G) \geq k$ and $n \geq 2k$, then the $k$-th power $G^k$ of $G$ has $k$ completely independent spanning trees.

Keywords: completely independent spanning tree, power of graphs, spanning trees.

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