COMPLETELY INDEPENDENT SPANNING TREES IN (PARTIAL) k-TREES

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Abstract

Two spanning trees \(T_1\) and \(T_2\) of a graph \(G\) are completely independent if, for any two vertices \(u\) and \(v\), the paths from \(u\) to \(v\) in \(T_1\) and \(T_2\) are internally disjoint. For a graph \(G\), we denote the maximum number of pairwise completely independent spanning trees by \(\text{cist}(G)\). In this paper, we consider \(\text{cist}(G)\) when \(G\) is a partial \(k\)-tree.

First we show that \(\lceil k/2 \rceil \leq \text{cist}(G) \leq k - 1\) for any \(k\)-tree \(G\). Then we show that for any \(p \in \{\lceil k/2 \rceil, \ldots, k - 1\}\), there exist infinitely many \(k\)-trees \(G\) such that \(\text{cist}(G) = p\). Finally we consider algorithmic aspects for computing \(\text{cist}(G)\). Using Courcelle’s theorem, we show that there is a linear-time algorithm that computes \(\text{cist}(G)\) for a partial \(k\)-tree, where \(k\) is a fixed constant.

Keywords: completely independent spanning trees, partial \(k\)-trees.

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References

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