Strong Steiner tree packing

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Abstract

Given a graph $G$ and $S \subset V(G)$, a $S$-Steiner-tree is a subtree of $G$ containing $S$. We call a subgraph $H$ strong $S$-subgraph if there exist a system of edge disjoint paths in $H$ with two end points in $S$, after splitting them to internal disjoint paths, they induces a $S$-Steiner-tree. In the case when $G - S$ is empty or all the vertices in $V(G) - S$ have even degrees, we give a necessary and sufficient condition for $G$ have $k$ edge-disjoint strong $S$-subgraph. In addition, we prove if $S$ is $34k$ edge-connected in $G$, then there exists $k$ edge-disjoint strong $S$-subgraph in $G$. Furthermore, if $S$ is $24k$ edge-connected in $G$, then there exists $k$ edge-disjoint $S$-Steiner-tree, which slightly improve Lap-Chi Lau’s result.