Critical extreme oints of the 2-edge connected spanning subgraph polytope

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Abstract

In this paper we study the extreme points of the polytope $P(G)$, the linear relaxation of the 2-edge connected spanning subgraph polytope of a graph G. We introduce a partial ordering on the extreme points of $P(G)$ and give necessary conditions for a non-integer extreme point of $P(G)$ to be minimal with respect to that ordering. We show that, if $\bar{x}$ is a non-integer minimal extreme point of $P(G)$, then G and $\bar{x}$ can be reduced, by means of some reduction operations, to a graph G' and an extreme point $\bar{x}'$ of $P(G')$ where G' and $\bar{x}'$ satisfy some simple properties. As a consequence we obtain a characterization of the perfectly 2-edge connected graphs, the graphs for which the polytope $P(G)$ is integral.