Abstract

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Let G be a simple connected graph on 2n vertices with a perfect matching. For a positive integer k, $1 \leq k \leq n - 1$, G is *k-extendable* if for every matching M of size k in G, there is a perfect matching in G containing all the edges of M. For an integer k, $0 \leq k \leq n - 2$, G is *strongly k-extendable* or simply *k*-extendable* if $G - \{u, v\}$ is k-extendable for every pair of vertices u and v of G. The problem that arises is that of characterizing k-extendable graphs and k*-extendable graphs. The first of these problems has been considered by several authors while the latter has been investigated only for the case $k = 0$. In this paper, we focus on the problem of characterizing k*-extendable graphs for any k. We present a number of properties of k*-extendable graphs including a relationship between k-extendable and k*-extendable graphs and some necessary and sufficient conditions for k*-extendable graphs. We also determine the set of realizable values for minimum degree of k*-extendable graphs. A complete characterization of k*-extendable graphs on 2n vertices for $k = n - 2$ and $n - 3$ is also established. Further, we investigate the independence number of G[S] when S is a minimum cutset of a k*-extendable graph G. An upper bound on a number of components of $G - S$ is also given.