Partition Dimension of Some Families of Trees

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Abstract

For an ordered set $W = \{w_1, w_2, \cdots, w_k\}$ of vertices in a connected graph G, the metric representation of a vertex v with respect to W is the vector $r(v|W) = (d(v, w_1), d(v, w_2), \cdots, d(v, w_k))$. A set W is called a resolving set of G if for every vertex v of G, its representation with respect to W is unique. A resolving set of G is called basis of G if it has minimum cardinality among all resolving sets of G. The metric dimension of G is the cardinality of a basis of G.

Given an ordered partition $\Pi = \{P_1, P_2, \cdots, P_t\}$ of vertices of a connected graph G, the partition representation of a vertex v with respect to Π is the vector $r(v|\Pi) = (d(v, P_1), d(v, P_2), \cdots, d(v, P_t))$. Π is a resolving partition for G if for every vertex v of G, its representation with respect to Π is unique. The partition dimension of G is the minimum number of sets in any resolving partition for G.

The metric dimensions of trees are known due to Chartrand *et. al* (2000); however, only few results on partition dimensions of trees are known. Here we determine the partition dimensions of caterpillars, firecrackers, and banana trees.