On the path partition dimension of a graph

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Abstract

For a graph $G$ and any two vertices $u$ and $v$ in $G$, let $d(u,v)$ denote the distance between $u$ and $v$ and let $d(G)$ be the diameter of $G$. For a subset $S$ of $V(G)$, the distance between $v$ and $S$ is $d(v,S) = \min\{d(v,x) \mid x \in S\}$. Let $\Pi = \{S_1, S_2, \ldots, S_k\}$ be an ordered $k$-partition of $V(G)$. The representation of $v$ with respect to $\Pi$ is the $k$-vector $r(v \mid \Pi) = (d(v,S_1), d(v,S_2), \ldots, d(v,S_k))$. $\Pi$ is a resolving partition for $G$ if the $k$-vectors $r(v \mid \Pi)$, $v \in V(G)$ are distinct. The minimum $k$ for which there is a resolving $k$-partition of $V(G)$ is the partition dimension of $G$, and is denoted by $pd(G)$. $\Pi = \{S_1, S_2, \ldots, S_k\}$ is a path resolving $k$-partition for $G$ if is a resolving partition and each subgraph $<S_i>$ induced by $S_i$, $1 \leq i \leq k$, is a path. The minimum $k$ for which there exists a path resolving $k$-partition of $V(G)$ is the path partition dimension of $G$, denoted by $ppd(G)$.

In this paper the path partition dimensions of some classes of well-known graphs are determined and connected graphs of order $n \geq 3$ having path partition dimension 2, $n$ or $n-1$ are characterized.

Keywords: distance, metric dimension, partition dimension, path partition dimension, resolving partition, path resolving partition, eccentricity.