RESOLVABILITY OF CORONA GRAPHS

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Given a set of vertices $S = \{v_1, v_2, ..., v_k\}$ of a connected graph G, the metric representation of a vertex v of G with respect to S is the vector $r(v|S) = (d(v, v_1), d(v, v_2), ..., d(v, v_k))$, where $d(v, v_i)$, $i \in \{1, ..., k\}$ denotes the distance between v and v_i. The set S is a resolving set for G if for every pair of different vertices $u, v \in V$, $r(u|S) \neq r(v|S)$. The metric dimension $dim(G)$ of G is the minimum cardinality of any resolving set for G.

Let G and H be two graphs of order n_1 and n_2, respectively. The corona product $G \odot H$ is defined as the graph obtained from G and H by taking one copy of G and n_1 copies of H and joining by an edge each vertex from the i^{th}-copy of H with the i^{th}-vertex of G. For any integer $k \geq 2$, we define the graph $G \odot^k H$ recursively from $G \odot H$ as $G \odot^k H = (G \odot^{k-1} H) \odot H$.

Here we study the metric dimension of $G \odot^k H$. For instance, among other results, we show that given two connected graphs G and H of order $n_1 \geq 2$ and $n_2 \geq 2$, respectively, if the diameter of H is at most two, then $dim(G \odot^k H) = n_1(n_2 + 1)^{k-1} dim(H)$. Moreover, if $n_2 \geq 7$ and the diameter of H is greater than five or H is a cycle graph, then $dim(G \odot^k H) = n_1(n_2 + 1)^{k-1} dim(K_1 \odot H)$.

Keywords: resolving sets, metric dimension, corona graph.

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