A mixed-model for domination reconfiguration

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The study of reconfiguration concerns the solutions to a problem and the relationships between those solutions. A reconfiguration graph can be constructed by representing each solution by a vertex; two vertices being adjacent if the corresponding solutions are related in some way. For a graph G, we can construct its *domination* reconfiguration graph $\mathcal{D}(G)$, where the vertices of $\mathcal{D}(G)$ represent dominating sets of G. Two vertices of $\mathcal{D}(G)$ are adjacent if and only if the corresponding dominating sets of G can be obtained from one another by the addition / removal of a single vertex of G. This adjacency rule is called the token addition / removal model reconfiguration rule.
We introduce a new model for domination reconfiguration, which combines the properties of token addition / removal (TAR) and token sliding (TS) models. The vertices of the TARS-graph correspond to the dominating sets of G; with two vertices being adjacent if they are adjacent via either the TAR or the TS reconfiguration rules. We show that if the underlying graphs are trees, complete graphs, or complete multipartite graphs, their TARS-graphs will be pancyclic. We also provide pancyclicity results for TARS-graphs of graph unions and joins, and conclude by posing the question: Are all TARS-graphs pancyclic?

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