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Partitioned Split Graphs

A graph G is a split graph if its vertex set can be partitioned into a clique K and a stable set S. Thus, the complement of a split graph is also a split graph. Unbalanced partitioned split graphs have a swing vertex that can move from either K to S (or S to K), while balanced partitioned split graphs have a unique partition. For a fixed choice of K and S, we define $G_{(K,S)}$ to be a partitioned split graph.

We discuss the action of three natural operators on the class of partitioned split graphs. The *inverse operator*, $Inv(G_{(K,S)})$, is the partitioned split graph that results from removing all edges within K and adding all edges between vertices S. The *swing operator*, $Sw(G_{(K,S)})$, is the partitioned split graph that results from moving a swing vertex from K to S (or S to K) if $G_{(K,S)}$ is unbalanced, and the identity map otherwise. The *complementary operator* of a partitioned split graph, $Comp(G_{(K,S)})$, is the graph complement, keeping the partition, so that the vertices in K become the stable set and the vertices in S become the clique.

These operators generate a group Γ on the class of partitioned split graphs. We show that there are graphs with all possible orbit sizes by dividing the class of partitioned split graphs into nine natural subclasses and describing the action of Γ between the classes.

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