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WREATH PRODUCTS AND AUTOMORPHISM GROUPS OF EDGE-COLORED GRAPHS

We study the converse of the classical results of Sabidussi and Hemminger on automorphism groups of graph compositions. Given a graph (or colored graph, digraph) whose automorphism group is a wreath product $A \wr B$, we ask whether it necessarily arises from the corresponding graph construction and whether A and B are themselves automorphism groups of the factors. For the natural imprimitive action, we obtain mainly positive results. We also investigate the product action of wreath products, where the situation is more intricate and leads to new open problems related to hypergraphs.