Distinguishing arc-colorings of symmetric digraphs

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A symmetric digraph $\overleftrightarrow{G}$ is obtained from a simple graph G by replacing each edge uv with a pair of opposite arcs $\overrightarrow{uv}$, $\overrightarrow{vu}$. An arc-coloring c of a digraph $\overleftrightarrow{G}$ is distinguishing if the only automorphism of $\overleftrightarrow{G}$ preserving the coloring c is the identity. A definition of proper arc-coloring of a digraph depends on a definition of adjacency of arcs. There are 15 possible definitions of a proper arc-coloring of a digraph since there are 15 possible definitions of adjacency of two arcs. For each type, we investigate the (distinguishing) chromatic index of $\overleftrightarrow{G}$, i.e. the smallest number of colors in a (distinguishing) proper coloring of $\overleftrightarrow{G}$. Colorings of arcs of a symmetric digraph $\overleftrightarrow{G}$ are equivalent to colorings of halfedges of the graph G, which have applications in computer science.

This is joint work with Rafał Kalinowski and Monika Pilśniak.

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