

# Efficient automorphism breaking in graphs

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A graph  $G$  is called 2-distinguishable if it has a 2-partition  $\{V_1, V_2\}$  of its set of vertices that is only preserved by the identity automorphism. The size of the smaller one of the sets  $V_1, V_2$  is called the *cost* of breaking  $\text{Aut}(G)$ .

Infinite locally finite graphs  $G$  are 2-distinguishable and have finite cost if and only if  $\text{Aut}(G)$  is countable. We present new bounds for the cost of such graphs and for countable graphs with countable group that are not locally finite.

For infinite 2-distinguishable graphs with uncountable automorphism group the cost is infinite, but one of the sets  $V_1, V_2$  may have zero density in  $V(G)$ . We show that this is the case for infinite, homogeneous trees, tree-like graphs and graphs of low growth.