Symmetry breaking by labelings

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The *distinguishing index* $D'(G)$ of a graph G is the least cardinal d such that G has an edge labeling with d labels that is preserved only by the trivial automorphism.

This is an analog to the notion of the distinguishing number $D(G)$ of a graph G, which is defined for labelings of vertices by Albertson and Collins. We obtain a general upper bound $D'(G) \leq \Delta(G)$ unless G is a small cycle C_3, C_4 or C_5. We present also quite better bound for some classes of graphs: traceable graphs, claw-free graphs and 3-connected planar graphs.

We derive several bounds for infinite graphs, in particular, we prove the general bound $D'(G) \leq \Delta(G)$ for an arbitrary infinite graph. Nonetheless, the distinguishing index is at most two for many countable graphs, also for the Cartesian product of denumarable graphs.

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