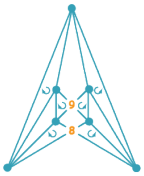

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ASYMMETRIC EDGE-COLOURINGS OF 2-CONNECTED COUNTABLE GRAPHS

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The distinguishing index $D'(G)$ of a graph G is the least number of colours in an edge-colouring (not necessarily proper) which is not preserved by any non-trivial automorphism of G. It was proved in [1] that $D'(G) \leq \Delta(G)$ for every finite connected graph G except for short cycles of length up to five. The sharp upper bound $D'(G) \leq \Delta(G) - 1$ for infinite connected graphs, except for the two-sided infinite path, was provided in [2]. Recently, these bounds were considerably reduced for graphs without pendant edges.

Theorem 1 ([3]) *If G is a countable connected graph with $\delta(G) \geq 2$, then*

$$D'(G) \leq \left\lceil \sqrt{\Delta(G)} \right\rceil + 1.$$

It was also conjectured in [3] that complete bipartite graphs K_{2,r^2}, for $r \in \mathbb{N}$, are the only graphs of order at least seven satisfying the equality. We prove this conjecture.

References

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[2] M. Pilśniak, M. Stawiski, *The Optimal General Upper Bound for the Distinguishing Index of Infinite Graphs*, J. Graph Theory, to appear, doi: 10.1002/jgt.22496.

[3] W. Imrich, R. Kalinowski, M. Pilśniak and M. Woźniak, *The distinguishing index of connected graphs without pendant edges*, manuscript (2019), submitted.