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Automorphism breaking in locally finite graphs

A colouring of a graph G is called distinguishing if its stabiliser in $\mathrm{Aut}\, G$ is trivial. It has been conjectured that, if every automorphism of a locally finite graph moves infinitely many vertices, then there is a distinguishing 2-colouring.

We investigate properties of random 2-colourings of such graphs and show that the stabiliser of such a colouring is almost surely nowhere dense in $\mathrm{Aut}\, G$ and a null set with respect to the Haar measure on the automorphism group. We also mention several special cases where a random 2-colouring is almost surely distinguishing.