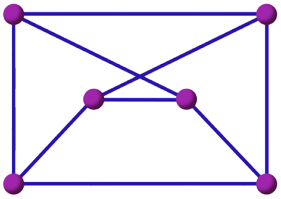

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List Edge Infinite Motion Conjecture

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Symmetry breaking in graphs is studied via distinguishing colourings, that is, colourings preserved only by the identity automorphism. A key parameter in this context is the *(edge) motion* of an automorphism $\varphi \in \mathrm{Aut}(G)$, defined as the number of (edges) vertices moved by φ; the (edge) motion of a graph G is then the minimum number of (edges) vertices moved by a non-identity automorphism. A classical result of Russell and Sundaram shows that, for finite graphs, sufficiently large motion implies that two colours suffice to break all nontrivial automorphisms. This led Tucker to propose the Infinite Motion Conjecture, recently confirmed by Babai in 2022, which states that every connected locally finite graph with infinite motion admits a distinguishing vertex colouring with two colours.

In this talk, we consider distinguishing edge colourings and their list variants. The Edge Infinite Motion Conjecture states that every countable connected graph with infinite edge motion has a distinguishing edge colouring with two colours. Its natural list variant, which we call the List Edge Infinite Motion Conjecture, states that every countable connected graph with infinite edge motion admits a distinguishing edge colouring from any assignment of lists of size two to its edges.

We prove a stronger version of this conjecture for locally finite graphs. Namely, we show that every locally finite connected graph with infinite motion admits $2^{\aleph_0}$ pairwise non-isomorphic distinguishing edge L-colourings for any assignment L of lists of size two to the edges of G.