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INFINITE MOTION CONJECTURE FOR TREES OF ARBITRARY CARDINALITY

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We say that the vertex colouring c *breaks* an automorphism ϕ of the graph G if $c(x) \neq c(\phi(x))$ for some $x \in V(G)$. The *distinguishing number* $D(G)$ of a graph G is the least cardinal number d such that G has a colouring with d colours which breaks every non-trivial automorphism of the graph. The *motion* of a graph G is the smallest number of vertices moved by a non-trivial automorphism. The infinite motion conjecture by Tucker says that if G is locally finite, connected graph with infinite motion, then $D(G) \leq 2$.

Lehner and Möller proved that the assumption of local finiteness cannot be dropped in the general case. However, this assumption can be replaced by requiring the graph to only be countable if we consider only trees instead of arbitrary graphs. Moreover, we prove that if a tree T of size κ has an infinite motion λ and if $2^\lambda \geq \kappa$, then $D(T) = 2$, which is the best possible result considering only the motion and the size of a tree.