Mednykh, Aleksandr Dmitrievich

Fixed points of cyclic groups acting purely harmonically on a graph. (English) Zbl 1462.05182

Summary: Let $X$ be a finite connected graph, possibly with loops and multiple edges. An automorphism group of $X$ acts purely harmonically if it acts freely on the set of directed edges of $X$ and has no invertible edges. Define a genus $g$ of the graph $X$ to be the rank of the first homology group. A discrete version of the Wiman theorem states that the order of a cyclic group $\mathbb{Z}_n$ acting purely harmonically on a graph $X$ of genus $g > 1$ is bounded from above by $2g + 2$. In the present paper, we investigate how many fixed points has an automorphism generating a $\frac{3}{4}$ “large” cyclic group $\mathbb{Z}_n$ of order $n \geq 2g - 1$. We show that in the most cases, the automorphism acts fixed point free, while for groups of order $2g$ and $2g - 1$ it can have one or two fixed points.

MSC:
05C30 Enumeration in graph theory
39A10 Additive difference equations

Keywords:
graph; homological genus; harmonic automorphism; fixed point; Wiman theorem

Full Text: DOI

References:

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