

Improved bound on the movement of permutation groups

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Abstract

Let G be a permutation group on a set Ω with no fixed points in Ω and let m be a positive integer. Then we define the movement of G as, $m := \text{move}(G) := \sup_{\Gamma} \{|\Gamma^g \setminus \Gamma| \mid g \in G\}$. Let p be a prime, $p \geq 5$, and let $\text{move}(G) = m$. We show that if G is not a 2-group and p is the least odd prime dividing $|G|$, then $n := |\Omega| \leq 4m - p$. Moreover, the group G attaining the maximum bound if and only if G is isomorphic to either $(Z_p \cdot Z_{2^a}) \times Z_2^d$ or $(Z_p \cdot Z_{2^a}) \times Z_2^{d-1}$ where $2^a \mid (p-1)$ for some non-negative integer a , and $m = 2^{d-1} + \frac{p-1}{2}$, $d \geq 1$.