


On complete multipartite derangement graphs*

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Abstract

Given a finite transitive permutation group $G \leq \text{Sym}(\Omega)$, with $|\Omega| \geq 2$, the derangement graph Γ_G of G is the Cayley graph $\text{Cay}(G, \text{Der}(G))$, where $\text{Der}(G)$ is the set of all derangements of G . Meagher et al. [On triangles in derangement graphs, *J. Combin. Theory Ser. A*, 180:105390, 2021] recently proved that $\text{Sym}(2)$ acting on $\{1, 2\}$ is the only transitive group whose derangement graph is bipartite and any transitive group of degree at least three has a triangle in its derangement graph. They also showed that there exist transitive groups whose derangement graphs are complete multipartite.

This paper gives two new families of transitive groups with complete multipartite derangement graphs. In addition, we prove that if p is an odd prime and G is a transitive group of degree $2p$, then the independence number of Γ_G is at most twice the size of a point-stabilizer of G .


Keywords: Derangement graph, cliques, Erdős-Ko-Rado theorem, Cayley graphs.

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O polnih večdelnih premestitvenih grafih*

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Povzetek

Če je dana končna tranzitivna permutacijska grupa $G \leq \text{Sym}(\Omega)$, in je $|\Omega| \geq 2$, potem je premestitveni graf Γ_G grafa G Cayleyev graf $\text{Cay}(G, \text{Der}(G))$, pri čemer je $\text{Der}(G)$ množica vseh premestitev grafa G . Meagher in dr. [On triangles in derangement graphs, *J. Combin. Theory Ser. A*, 180:105390, 2021] so pred kratkim dokazali, da je $\text{Sym}(2)$, delujoča na $\{1, 2\}$, edina tranzitivna grupa, katere premestitveni graf je dvodelen, vsaka tranzitivna grupa stopnje najmanj tri pa ima trikotnik v svojem premestitvenem grafu. Pokazali so tudi, da obstajajo tranzitivne grupe, katerih premestitveni grafi so polni večdelni.

V tem članku predstavimo dve novi družini tranzitivnih grup s polnimi večdelnimi premestitvenimi grafi. Dokažemo tudi, da če je p liho praštevilo, G pa tranzitivna grupa stopnje $2p$, potem je neodvisnostno število grafa Γ_G največ dvakratnik velikosti točkovnega stabilizatorja grafa G .

Ključne besede: Premestitveni graf, koklike, Erdős-Ko-Radov izrek, Cayleyevi grafi.

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