


A new generalization of generalized Petersen graphs*

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Abstract

We discuss a new family of cubic graphs, which we call group divisible generalised Petersen graphs (*GDGP*-graphs), that bears a close resemblance to the family of generalised Petersen graphs, both in definition and properties. The focus of our paper is on determining the algebraic properties of graphs from our new family. We look for highly symmetric graphs, e.g., graphs with large automorphism groups, and vertex- or arc-transitive graphs. In particular, we present arithmetic conditions for the defining parameters that guarantee that graphs with these parameters are vertex-transitive or Cayley, and we find one arc-transitive *GDGP*-graph which is neither a *CQ* graph of Feng and Wang, nor a generalised Petersen graph.

Keywords: Generalised Petersen graph, arc-transitive graph, vertex-transitive graph, Cayley graph, automorphism group.

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Nova posplošitev posplošenih Petersenovih grafov*

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Povzetek

Obravnavamo novo družino kubičnih grafov, ki jo imenujemo grupno deljivi posplošeni Petersenovi grafi (*GDGP*-grafi), in je, tako po definiciji kot po lastnostih, zelo podobna družini posplošenih Petersenovih grafov. V članku se osredotočamo na določitev algebraičnih lastnosti grafov naše nove družine. Iščemo visoko simetrične grafe, t.j. grafe z velikimi grupami avtomorfizmov, in točkovno- ali ločno-tranzitivne grafe. Posebej, podamo aritmetične pogoje za določitvene parametre, ki zagotavljajo, da so grafi s temi parametri točkovno-tranzitivni ali Cayleyevi, in poiščemo primer ločno-tranzitivnega *GDGP*-grafa, ki ni niti *CQ* graf Fenga in Wanga niti posplošeni Petersenov graf.

Ključne besede: Posplošeni Petersenov graf, ločno-tranzitiven graf, točkovno-tranzitiven graf, Cayleyjev graf, grupa avtomorfizmov.

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