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Hamilton cycles in primitive graphs of order $2rs$*

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Abstract

After long term efforts, it was recently proved by Du, Kutnar and Marušič in 2021 that except for the Petersen graph, every connected vertex-transitive graph of order rs has a Hamilton cycle, where r and s are primes. A natural topic is to solve the hamiltonian problem for connected vertex-transitive graphs of $2rs$. This topic is quite nontrivial, as the problem is still unsolved even for that of $r = 3$ and 5. In this paper, it is shown that except for the Coxeter graph, every connected vertex-transitive graph of order $2rs$ contains a Hamilton cycle, provided the automorphism group acts primitively on vertices.

Keywords: Vertex-transitive graph, Hamilton cycle, primitive group, automorphism group, orbital graph.

Math. Subj. Class. (2020): 05C25, 05C45

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Hamiltonski cikli v primitivnih grafih reda $2rs$*

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Povzetek

Po dolgotrajnih prizadevanjih so Du, Kutnar in Marušič nedavno, leta 2021, dokazali, da ima vsak povezan točkovno tranzitiven graf reda rs, razen Petersenovega grafa, hamiltonski cikel, kjer sta r in s praštevili. Ob tem se naravno zastavlja vprašanje reševanja Hamiltonovega problema za povezane točkovno tranzitivne grafe reda $2rs$. To vprašanje je precej zahtevno, saj problem še vedno ni rešen niti za $r = 3$ in 5. V tem članku pokažemo, da, razen za Coxeterjev graf, vsak povezan vozliščno-tranzitiven graf reda $2rs$ vsebuje hamiltonski cikel, pri pogoju, da grupa avtomorfizmov na točkah grafa deluje primitivno.

Ključne besede: Točkovno tranzitiven graf, hamiltonski cikel, primitivna grupa, grupa avtomorfizmov, orbitalni graf.

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