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Automorphism groups of Walecki tournaments with zero and odd signatures

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Abstract

Walecki tournaments were defined by Alspach in 1966. They form a class of regular tournaments that posses a natural Hamilton directed cycle decomposition. It has been conjectured by Kelly in 1964 that every regular tournament possesses such a decomposition. Therefore Walecki tournaments speak in favor of the conjecture. A second interest in Walecki tournaments arises from the mapping between cycles of the complementing circular shift register and isomorphism classes of Walecki tournaments. The problem of enumerating non-isomorphic Walecki tournaments has not been solved to date. We characterize the arc structure of Walecki tournaments whose corresponding binary sequences have zero and odd signature. Automorphism groups are determined for zero signature Walecki tournaments and for odd signature Walecki tournaments with the zero signature Walecki subtournaments.

Walecki tournaments possess a broad range of subtournaments isomorphic to some Walecki tournament. Subtournaments of odd signature Walecki tournaments induced by the outsets of the central vertex are proven to be either regular or almost regular.

Keywords: Tournaments, Hamilton directed cycles, automorphism groups.

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Grupe avtomorfizmov Waleckijevih turnirjev z ničelnimi in lihimi signaturami

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Povzetek

Waleckijeve turnirje je definiral Alspach leta 1966. Tvorijo razred regularnih turnirjev, za katere obstaja naravna razčlenitev na hamiltonske usmerjene cikle. Kelly je leta 1964 postavil domnevo, da ima vsak regularen turnir takšno razčlenitev. Zato Waleckijevi turnirji pričajo v prid te domneve. Waleckijevi turnirji so zanimivi tudi zaradi preslikave med cikli komplementarnega cirkularnega registra premikov in izomorfnostnimi razredi Waleckijevih turnirjev. Problem enumeriranja neizomorfnih Waleckijevih turnirjev doslej še ni rešen. Karakteriziramo ločno strukturo Waleckijevih turnirjev, katerih ustrezna binarna zaporedja imajo ničelno ali liho signaturo. Določimo grupe avtomorfizmov za Waleckijeve turnirje z ničelno signaturo in za Waleckijeve turnirje z liho signaturo, katerih Waleckijevi podturnirji imajo ničelno signaturo.

Waleckijevi turnirji imajo široko paleto podturnirjev, izomorfnih istemu Waleckijevemu turnirju. Dokažemo, da so podturnirji Waleckijevih turnirjev z liho signaturo, inducirani s sosednimi množicami središčnega vozlišča, bodisi regularni bodisi skoraj regularni.

Ključne besede: Turnirji, hamiltonski usmerjeni cikli, grupe avtomorfizmov.

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