ON THE NUMBER OF DISJOINT 4-CYCLES IN REGULAR TOURNAMENTS¹

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Abstract

In this paper, we prove that for an integer $r \geq 1$, every regular tournament T of degree $3r - 1$ contains at least $\frac{21}{16}r - \frac{10}{3}$ disjoint directed 4-cycles. Our result is an improvement of Lichiardopol's theorem when taking $q = 4$ [Discrete Math. **310** (2010) 2567–2570]: for given integers $q \geq 3$ and $r \geq 1$, a tournament T with minimum out-degree and in-degree both at least $(q - 1)r - 1$ contains at least r disjoint directed cycles of length q .

Keywords: regular tournament, C_4 -free, disjoint cycles.

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REFERENCES

- [1] Y. Bai, B. Li and H. Li, *Vertex-disjoint cycles in bipartite tournaments*, Discrete Math. **338** (2015) 1307–1309.
doi:10.1016/j.disc.2015.02.012
- [2] J. Bang-Jensen, S. Bessy and S. Thomasse, *Disjoint 3-cycles in tournaments: a Proof of the Bermond-Thomassen conjecture for tournaments*, J. Graph Theory **75** (2014) 284–302.
doi:10.1002/jgt.21740
- [3] J.C. Bermond and C. Thomassen, *Cycles in digraphs-a survey*, J. Graph Theory **5** (1981) 1–43.
doi:10.1002/jgt.3190050102

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- [4] S. Bessy, N. Lichiardopol and J.S. Sereni, *Two proofs of the Bermond-Thomassen conjecture for tournaments with bounded minimum in-degree*, Discrete Math. **310** (2010) 557–560.
doi:10.1016/j.disc.2009.03.039
- [5] N. Lichiardopol, A. Pór and J.S. Sereni, *A step toward the Bermond-Thomassen conjecture about disjoint cycles in digraphs*, SIAM J. Discrete Math. **23** (2009) 979–992.
doi:10.1137/080715792
- [6] N. Lichiardopol, *Vertex-disjoint cycles in regular tournaments*, Discrete Math. **312** (2012) 1927–1930.
doi:10.1016/j.disc.2012.03.009
- [7] N. Lichiardopol, *Vertex-disjoint directed cycles of prescribed length in tournaments with given minimum out-degree and in-degree*, Discrete Math. **310** (2010) 2567–2570.
doi:10.1016/j.disc.2010.06.024
- [8] C. Thomassen, *Disjoint cycles in digraphs*, Combinatorica **3** (1983) 393–396.
doi:10.1007/BF02579195

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