Bensmail, Julien; **Harutyunyan, Ararat**; **Le, Ngoc Khang**; **Li, Binlong**; **Lichiardopol, Nicolas**
Disjoint cycles of different lengths in graphs and digraphs. (English) Zbl 1376.05038
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Summary: In this paper, we study the question of finding a set of k vertex-disjoint cycles (resp. directed cycles) of distinct lengths in a given graph (resp. digraph). In the context of undirected graphs, we prove that, for every $k \geqslant 1$, every graph with minimum degree at least $\frac{k^2+5k-2}{2}$ has k vertex-disjoint cycles of different lengths, where the degree bound is best possible. We also consider other cases such as when the graph is triangle-free, or the k cycles are required to have different lengths modulo some value r. In the context of directed graphs, we consider a conjecture of Lichiardopol concerning the least minimum out-degree required for a digraph to have k vertex-disjoint directed cycles of different lengths. We verify this conjecture for tournaments, and, by using the probabilistic method, for some regular digraphs and digraphs of small order.

MSC:

05C12 Distance in graphs
05C07 Vertex degrees
05C20 Directed graphs (digraphs), tournaments
05C38 Paths and cycles

Keywords:

vertex-disjoint cycles; different lengths; minimum degree

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