

Combinatorics Seminar

Wednesday, April 13, 2011
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Linked Graph with Modular Constraints

Dr. Zhiquan Hu
Faculty of Mathematics and Statistics
Central China Normal University, Wuhan 430079, China

ABSTRACT

A graph $G$ is $k$-linked if $G$ has at least $2k$ vertices, and for every sequence $x_1, x_2, \ldots, x_k, y_1, y_2, \ldots, y_k$ of distinct vertices, $G$ contains $k$ vertex-disjoint paths $P_1, P_2, \ldots, P_k$ such that $P_i$ joins $x_i$ and $y_i$ for $i = 1, 2, \ldots, k$. Moreover, the above defined $k$-linked graph $G$ is $k$-linked modulo $(m_1, m_2, \ldots, m_k)$ if, in addition, for any $k$-tuple $(d_1, d_2, \ldots, d_k)$ of natural numbers, the paths $P_1, P_2, \ldots, P_k$ can be chosen such that $P_i$ has length $d_i$ modulo $m_i$ for $i = 1, 2, \ldots, k$. Thomassen showed that there exists a function $f(m_1, m_2, \ldots, m_k)$ such that every $f(m_1, m_2, \ldots, m_k)$-connected graph is $k$-linked modulo $(m_1, m_2, \ldots, m_k)$ provided all $m_i$ are odd. For even moduli, he showed in another article that there exists a natural number $g(2, 2, \cdots, 2)$ such that every $g(2, 2, \cdots, 2)$-connected graph is $k$-linked modulo $(2, 2, \cdots, 2)$ if deleting any $4k - 3$ vertices leaves a non-bipartite graph.

In this talk, we show linear upper bounds for $f(m_1, m_2, \ldots, m_k)$ and $g(m_1, m_2, \ldots, m_k)$ in terms of $m_1, m_2, \ldots, m_k$, respectively. Our results generalize several known results on $k$-parity-linked graphs. This is a joint work with Guantao Chen, Yuan Chen and Shuhong Gao.