Abstract
Cycle Decompositions of Complete Digraphs

Peter Danziger

Toronto, Canada

We consider the problem of decomposing the complete directed graph K_n^* into directed cycles of given lengths. We consider general necessary conditions for a directed cycle decomposition of K_n^* into t cycles of lengths $m_1, m_2, \ldots, m_t$ to exist and provide a construction for creating such decompositions in the case where there is one 'large' cycle.

We give a complete solution in the case when there are exactly three cycles of lengths $\alpha, \beta, \gamma \neq 2$. Somewhat surprisingly, the general necessary conditions turn out not to be sufficient in this case. In particular, taking $2 < \alpha \leq \beta \leq \gamma$, when $\gamma = n$, $\alpha + \beta > n + 2$ and $\alpha + \beta \equiv n \pmod 4$, K_n^* is not decomposable.

Joint work with Andrea Burgess and Tariq Javed.