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Cycle systems of the complete multipartite graph

An $\ell$-cycle system of a graph $\Gamma$ is a set of $\ell$-cycles of $\Gamma$ whose edges partition the edge set of $\Gamma$; is it regular if there is an automorphism group $G$ of $\Gamma$ acting regularly on the vertices of $\Gamma$ and permuting the cycles, cyclic if $G$ is cyclic.

When $\Gamma$ is $K_m[n]$, the complete multipartite graph with $m$ parts each of size $n$, the existence problem for $\ell$-cycle systems is not completely solved, and little is known on regular systems. We discuss new existence results for cycle systems of $K_m[n]$, concentrating mostly on cyclic systems.