Cycle decompositions of generalised complete graphs

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Abstract

Obvious necessary conditions for a graph G to admit a decomposition into cycles of length k are that *(i)* G has at least k vertices; *(ii)* every vertex in G has even degree; and *(iii)* the total number of edges in G is a multiple of k. In the case that $G \cong K_n$, the complete graph on n vertices, these conditions are known to be sufficient. In this talk we discuss the conjecture that conditions *(i)*, *(ii)* and *(iii)* are also sufficient in the case where $G \cong K_n * \overline{K}_m$, the complete equipartite graph having n parts of size m. In particular, we describe several new techniques for obtaining cycle decompositions of $K_n * \overline{K}_m$ from cycle decompositions of mK_n, the m-fold complete multigraph on n vertices.

**This will be an elementary talk in which no prior knowledge of graph theory is assumed.*