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Gregarious cycles: an antipodean update

A complete multipartite graph $K(a_1, a_2, \ldots, a_n)$ has its vertices partitioned into n parts or "partite sets" of size a_i, $1 \leqslant i \leqslant n$, and any pair of vertices is joined by an edge if and only if the vertices lie in different partite sets.

A k-cycle decomposition of $G = K(a_1, a_2, \ldots, a_n)$ is a partition of all the edges of G into k-cycles. The decomposition is said to be 'gregarious' if every possible k-cycle in the decomposition has all its k vertices lying in different partite sets (so necessarily the cycle length k does not exceed the number of parts n).

An update on the present state of play regarding existence of gregarious k-cycle systems will be given.

Joint with Benjamin R. Smith.