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Closed trail decompositions of complete equipartite graphs

The complete equipartite graph $K_m * \overline{K_n}$ has mn vertices which are partitioned into m parts, each of size n , with two vertices adjacent if and only if they are not in the same part. The final determination of necessary and sufficient conditions for decomposition of K_m and $K_m * \overline{K_2}$ into cycles of fixed length was made by Alspach, Gavlas and Šajna, while necessary and sufficient conditions for decomposition of these graphs into closed trails of arbitrary lengths were proven by Balister. Since the appearance of these results, much focus has shifted towards the corresponding decomposition problems for complete equipartite graphs in general. In this talk, we consider decomposition of $K_m * \overline{K_n}$ into closed trails in the case that all trails are of the same length. In particular, we give necessary and sufficient conditions for the existence of a decomposition of $K_m * \overline{K_n}$ into closed trails of length k .

This is joint work with Mateja Šajna.