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Cyclic partitions of complete hypergraphs

Let $V_n = \{1, 2, \dots, n\}$. A *cyclic q -partition* of a complete k -hypergraph $\mathcal{K}_n^{(k)} = (V_n, \binom{V_n}{k})$ is a partition of the edge set $\binom{V_n}{k}$ of the form $\{E, E^\theta, E^{\theta^2}, \dots, E^{\theta^{q-1}}\}$, where θ is a permutation of the set V_n . We give a necessary and sufficient condition for θ to be a cyclic q -partition of $\mathcal{K}_n^{(k)}$. We deduce the characterisations of cyclic q -partitions of hypergraphs $\mathcal{K}_n^K = (V_n, \bigcup_{k \in K} \binom{V_n}{k})$ for some $K \subset V_{n-1}$.