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c7 AND C7 COMPLEMENT MULTIDECOMPOSITION OF Kn

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If all edges of $K_n$ can be partitioned into copies of a graph G, such design is called a G-decomposition of $K_n$, or G-design of order $n$. The extension of this design, called multi-decomposition, is decomposition of $K_n$ by a graph pair. For any integer $v \geq 4$, a graph-pair of order $v$ is a pair of non-isomorphic graphs $G$ and $H$ of order $v$ such that there are no isolated vertices and $E(G) \cup E(H) = E(K_n)$. A $(G; H)$ —multi-decomposition of $K_n$ is determined when all edges of $K_n$ can be partitioned into copies of $G$ and $H$ with at least a copy of either $G$ or $H$. In the past, the multi-designs for all graph-pairs of order 4 and 5 have been finished and published in 2003. The necessary and sufficient conditions for the existence of a $(C_6; \overline{C_6})$ —multi-decomposition of $K_n$ has also been found out by Gao Yizhe. This paper is dedicated to continuing the project by determining the condition for $n$ such that there exists $(C_7, \overline{C_7})$ —multi-decomposition of $K_n$.

Reference