Separability of Cayley schemes over abelian p-groups

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A Cayley scheme is called *separable* with respect to the class of Cayley schemes $\mathcal{K}$ if it is determined up to isomorphism in $\mathcal{K}$ only by its intersection numbers. We say that an abelian group G is *separable* if every Cayley scheme over G is separable with respect to the class of Cayley schemes over abelian groups. Denote the cyclic group of order n by C_n. Let G be a noncyclic abelian p-group. From the previously known results it follows that if G is separable then G is isomorphic to $C_p \times C_{p^k}$ or $C_p \times C_p \times C_{p^k}$, where $p \in \{2, 3\}$ and $k \geq 1$. In fact, all Cayley schemes over $C_p \times C_{p^k}$ were classified in [1] for $p = 2$ and in [2] for $p = 3$. By using this classification we prove that the groups $G = C_p \times C_{p^k}$ are separable whenever $p \in \{2, 3\}$. The obtained result implies the solution of the graph isomorphism problem in time $|G|^{O(1)}$ in the class of graphs that isomorphic to Cayley graphs over G. Also based on the description of all Cayley schemes over G we solve in time $|G|^{O(1)}$ the following problem: given a graph Γ on $|G|$ verticies determine whether Γ is isomorphic to a Cayley graph over G.

References

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