

Cyclic complements and skew morphisms of groups

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A skew morphism of a group is a variant of an automorphism, which arises in the study of regular Cayley maps (regular embeddings of Cayley graphs on surfaces, with the property that the ambient group induces a vertex-regular group of automorphisms of the embedding). More generally, skew morphisms arise in the context of any group expressible as a product AB of subgroups A and B with B cyclic and $A \cap B = \{1\}$. Specifically, a skew morphism of a group A is a bijection $\varphi: A \rightarrow A$ fixing the identity element of A and having the property that $\varphi(xy) = \varphi(x)\varphi^{\pi(x)}(y)$ for all $x, y \in A$, where $\pi(x)$ depends only on x . The kernel of φ is the subgroup of all $x \in A$ for which $\pi(x) = 1$. In this talk I will present some of the theory of skew morphisms, including some new theorems: two about the order and kernel of a skew morphism of a finite group, and a complete determination of the finite abelian groups for which every skew morphism is an automorphism.

Much of this is joint work with Robert Jajcay and Tom Tucker.