# On atoms in the lattice of finite kaleidoscopic regular maps with trinity symmetry

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**Abstract**

It is known that the monodromy group of any regular unoriented map $M$ can be uniquely (up to isomorphism) represented as an abstract group $G$ with a triple $(a, b, c)$ of involutory generators such that $ac = ca$ (we will write $M = (G; a, b, c)$). In this representation the valency of $M$ is just the order of $bc$ and operators of duality, Petrie-duality and $e$-th hole operator can be interpreted as the change of the generating triple $(a, b, c)$ to the triple $(c, b, a)$, $(ac, b, c)$ and $(a, (bc)^{e-1}b, c)$, respectively. Regular map $M$ which is invariant with respect to all of these operators (for every $e$ co-prime to the valency of $M$) is said to be *kaleidoscopic regular map with trinity symmetry (KRT)*.

We say that map $M = (G; a, b, c)$ *covers* map $M' = (G'; a', b', c')$ if the assignment $a \mapsto a'$, $b \mapsto b'$, $c \mapsto c'$ extends to a group homomorphism $G \to G'$. It is easy to verify that (isomorphism classes of) finite regular maps form a lattice with respect to the relation of being covered and that finite KRTs form a sublattice of this lattice.

In this talk we characterize KRTs which are atoms in the above sublattice as the least common covers of special families of regular maps with simple monodromy groups. We also present results of an exhaustive computer search with focus on atoms of odd valency and atoms with simple monodromy groups.