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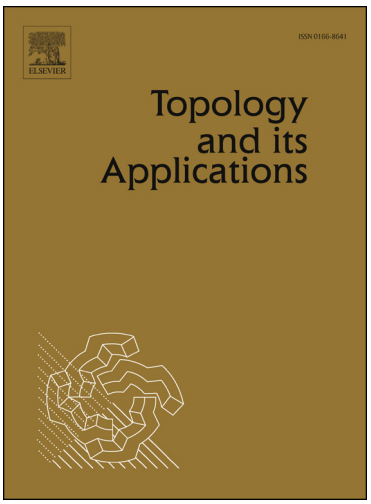

On a canonical construction of tessellated surfaces from finite groups

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On a canonical construction of tessellated surfaces from finite groups.

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Abstract

In this paper we study an elementary functorial construction from the category of finite non-abelian groups to the category of singular compact, oriented 2-manifolds. After a desingularization process this construction results in a finite collection of compact, connected, oriented smooth surfaces equipped with a closed-cell structure which is face and edge transitive. These tessellated surfaces are best viewed as regular or dual quasi-regular maps, i.e., cellular graph embeddings into the surface with a high degree of symmetry. This construction in fact exhibits the noncommutative part of the group's multiplication table as equivalent to a collection of such maps.

It generally results in a large collection of maps per group, for example when the construction is applied to Σ_6 it yields 4477 maps of 27 distinct genus.

We study the distribution of these maps in various groups. We also show that extensions of groups result in branched coverings between the component surfaces in their decompositions. Finally we exploit functoriality to obtain interesting faithful, orientation preserving actions of subquotients of these groups and their automorphism groups on these surfaces and maps.

Keywords: Riemann surface tessellations, regular graph maps, strong symmetric genus.

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Contents