

ON THE WGSC AND QSF TAMENESS CONDITIONS FOR FINITELY PRESENTED GROUPS

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The present article concerns itself with the weakly geometric simply connected (wgsc) property for finitely generated groups. A group has this property if it is the fundamental group of a compact polyhedron whose universal cover is wgsc, which is to say that it has an exhaustion by connected and simply connected compact polyhedra.

The motivation comes from studying geometric conditions on the Cayley graph of a finitely presented group in order to determine when the universal cover of a given compact 3-manifold is homeomorphic to \mathbb{R}^3 . The authors relate wgsc to other tameness properties, namely the quasi-simply filtered (qsf) property and tame 1-combability. A piecewise linear, simply connected space is qsf roughly if any compact subpolyhedron can be approximated piecewise-linearly by the image of a simply connected and compact polyhedron. A 1-combing of a 2-complex is a choice of a basepoint and paths in the 1-skeleton connected the basepoint to every other vertex in the complex. There is a technical tameness condition on combings which allows the authors to define tame 1-combings.

The authors concern themselves with the almost-equivalence relation on these various tameness properties. They show, for instance, that wgsc, qsf and tame 1-combability are almost-equivalent topological properties of finitely presented groups. They conclude that qsf is a quasi-isometry invariant. The authors are able to prove that a finitely presented HNN extension of the Grigorchuk group is qsf.

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