

Seminarium geometrów

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Solving word equations in free groups and RAAGs by recompression

Abstract: In this talk I will present an algorithm for solving equations in free groups, in particular, the algorithm gives a graph-like representation of all solutions. The main idea is to reduce the case of groups to semigroups (with simple regular constraints and involution) and then employ a technique of local recompression. The technique is based on local modification of variables (replacing X by aX or Xa) and iterative replacement of pairs of letters occurring in the equation by a ‘fresh’ letter, which can be seen as a bottom-up compression of the solution of the given equation. The inverse of this operation can be interpreted as a homomorphism between finitely generated groups/semigroups, thus yielding the promised representation. The crucial, though simple, part of the proof is the linear bound of the considered equations. I will also discuss generalisations of this algorithms to right-angled Artin groups (RAAGs).