Geometric and Algebraic Properties of Twin Groups

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There is the theory of doodles and twins in combinatorial topology, which is similar to link and braid theory. A doodle on a surface is a union of several closed curves that are intersecting transversally. In contrast to links and braids, for twins and doodles, the first and the second Reidemeister moves are only allowed. It is well known that any doodle can be presented as a closure of some twin. This means that any regularity between doodles can be stated in terms of twins. Twins on several strands form a group, which is right-angled Coxeter group. There is a problem of determining its lower central series and other algebraic properties. More precisely, it is unknown whenever twin groups are residually nilpotent. In our work, we use a geometric interpretation of twins and study them in the geometric group theory point of view. We introduce so-called base involutions and classify cone types and elements of finite order in twin groups. Using geometric interpretation, we also solved the problem above, i.e. proved that twin groups are residually nilpotent.

Awards Won:
American Mathematical Society: Certificate of Honorable Mention