Commutator Lengths of Free Group Orbits and Their Squares

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This work is devoted to finding an element in a free group’s commutator subgroup such that the commutator length of the square is less than the commutator length. The results obtained allow us to compute couples (cl(w), cl(w^2)) for all elements w of fixed lengths in a free group of rank 2. Using our idea of the stable commutator length of elements in one orbit of F = F(x, y) with respect to the action of the automorphism group Aut(F), we have developed an algorithm which calculates the commutator lengths of orbits of a free group as well as the squares which have an element of length <= n.

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