Graev Metrics On Free Groups

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February 13, 2013

Abstract

In this talk I will present a result about the computation of the Graev metric δ on free groups.

Theorem 1. *Let u be a non-trivial element in a free group $F(a,b)$ with two generators. Let v be its non-trivial initial segment. If u is not rotationally reduced, we have $\delta(u^n v, e) \geq n + 1$ for all $n \in \mathbb{N}$.*

In particular, this result indicates for every non-trivial element u of free groups, the set $\{\delta(u, e) : n = 1, 2, \cdots\}$ is unbounded. This answers a question of Van Den Dries and Gao. Furthermore, this result indicates that the new Polish group introduced by Van Den Dries and Gao based on the free group with two generators with the Graev metric has no small subgroups.