

A NOTE ON GEOMETRIC CONSTRUCTIONS OF BI-INVARIANT ORDERINGS

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In the article under review, the author uses geometric methods to construct bi-invariant orderings on residually torsion-free nilpotent groups. He uses Chen's iterated integrals and holonomy map [Bull. Amer. Math. Soc. 83 (1977), no. 5, 831–879; MR0454968 (56 #13210)] to construct bi-invariant orderings of certain maximal residually torsion-free nilpotent quotients of fundamental groups of smooth manifolds. Such orderings are called holonomy orderings.

This method gives a geometric proof of the bi-orderability of residually torsion-free nilpotent groups. The author then shows that a standard method for constructing bi-invariant orderings on residually torsion-free nilpotent groups, namely via iterated central extensions, is equivalent to the method of holonomy orderings. He shows that the Magnus ordering on free groups is a holonomy ordering. He also relates holonomy orderings to finite-type invariants to give lexicographical expressions of holonomy orderings on pure braid groups.

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