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Volker Diekert* (diekert@fmi.uni-stuttgart.de), Universitaetsstrasse 38, 70569 Stuttgart, Germany. *Conjugacy in Baumslag's group, generic case complexity, and division in power circuits.*

In my talk I will report on a recent joint work with Alexei Myasnikov and Armin Weiß. The motivation stems from algorithmic group theory. It concerns the conjugacy problem for two prominent groups: the Baumslag-Solitar group $BS(1,2)$ and the Baumslag's group $BG(1,2)$. The groups are quite different although the second one, $B(1,2)$ is still a one-relator group and obtained by a single HNN extension of the Baumslag-Solitar group $BS(1,2)$. The word problem and the conjugacy problem in the Baumslag-Solitar group is easy, but this does not transfer to $BG(1,2)$.

Our main result shows that conjugacy in $BG(1,2)$ can be solved in polynomial time in a strongly generic setting. The result is surprising because our algorithm has non-elementary average case complexity; and we conjecture that this is the best we can expect. This is interesting in a broader sense since it relates a natural conjugacy problem in algorithmic group theory to integer division in power circuits. A power circuit is a data structure which allows to represent huge numbers involving tower functions by small graphs. Actually, the complexity of the division problem in power circuits is an open and interesting problem in arithmetic. (Received September 08, 2014)