Higher Commutators in Mal'cev Algebras Properties and Applications

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August 24, 2007

Abstract

We are interested in the following problem:

> Given a finite Mal'cev algebra $\mathbf{A}$, can the clone of polynomial functions be described by finitely many relations on R?

More precisely, for a given finite Mal'cev algebra $\mathbf{A}$, we ask the following: Is there a *finite* set of relations R that is preserved by all polynomial functions of $\mathbf{A}$ such that every function on $\mathbf{A}$ that preserves all relations in R is a polynomial function?

We develop higher commutators, which were introduced by A. Bulatov in the paper *On the number of finite Mal'tsev algebras*, Contributions to General Algebra **13**, Verlag Johannes Heyn, Klagenfurt 2001, 41-54. In our talk, we present some additional properties and alternative descriptions of higher commutators.

These properties are needed to prove that for a Mal'cev algebra $\mathbf{A}$ with congruence lattice of height two, there is a finite set of relations R that is preserved by all polynomial functions of $\mathbf{A}$ such that every function on $\mathbf{A}$ which preserves all relations in R is a polynomial function.

This is joint work with Erhard Aichinger, Institut für Algebra, Johannes Kepler Universität Linz, Austria.