EQUATION SOLVABILITY OVER SUPERNILPOTENT MAL'CEV ALGEBRAS IS TRACTABLE

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For a given algebra $\mathbf{A}$, the equation solvability problem over $\mathbf{A}$ is the computational problem of deciding whether an equation of polynomials $f(x_1, ..., x_n) = g(x_1, ..., x_n)$ has a solution in $\mathbf{A}$ or not. The complexity of such problems is well-studied for rings and groups. In particular, it is known that the equation solvability over nilpotent rings and groups is in P. In [Hor11] Horváth gave a proof of this result by showing the following structural statement: For every finite nilpotent group/ring there exists a constant d, such that for every polynomial f, and every tuple $(a_1, ..., a_n)$, its image $f(a_1, ..., a_n)$ is equal to some $f(b_1, ..., b_n)$, where at most d many of the b_i's are set to a_i, and the rest is equal to 0.

In this talk I am going to show how Horváth's result can be lifted to finite supernilpotent algebras with a Mal'cev term. This result was independently proven by Idziak and Krzaczkowski in [IK17]. Furthermore I am going to discuss which steps are still missing in proving a complexity dichotomy for the equation solvability over congruence modular algebras.

References

[Hor11] Gábor Horváth. The complexity of the equivalence and equation solvability problems over nilpotent rings and groups. *Algebra universalis*, 66(4):391–403, 2011.

[IK17] Paweł M Idziak and Jacek Krzaczkowski. Satisfiability in multi-valued circuits. *arXiv preprint arXiv:1710.08163*, 2017.

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