The tangent Lie algebras of automorphism groups of free algebras

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Abstract.

We introduce the notion of tangent Lie algebras for certain automorphism groups of free algebras as a subalgebra of the algebra of derivations. We show that for many classical varieties of algebras the tan-gent Lie algebra is a subalgebra of the Lie algebra of all derivations with constant divergence. We also introduce the notions of approximately tame and absolutely wild automorphisms of free algebras of any variety of algebras and use tangent Lie algebras for their study. It is shown that almost all known examples of wild automorphisms of free algebras are absolutely wild except Nagata and Anick automorphisms. We show that the Bergman automorphism of free matrix algebras of order two is absolutely wild. It is also shown that free algebras of any variety of polynilpotent Lie algebras, except abelian and metabelian varieties, have absolutely wild automorphisms.

(A joint work with U.Umirbaev).