



APRESENTA:

Polynomial identities, codimension growth and existence of PI exponent of pairs

04/10/2024 às 10h00
Auditório da UAMat

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Abstract. Let K be a field of characteristic zero. The pair (A, S) where A is an associative K -algebra generated by a vector subspace S is called an AS pair. The polynomial $f(x_1, \dots, x_n)$ of the free associative algebra $K\langle X \rangle$ is a weak polynomial identity of (A, S) if $f(s_1, \dots, s_n) = 0$ for all $s_1, \dots, s_n \in S$. Such identities were introduced by Razmyslov [2] for the case when S is a Lie algebra (that is a vector subspace of A closed under the Lie bracket). He used the weak identities of the pair $(M_2(K), sl_2(K))$ in order to obtain finite basis of the identities satisfied by the Lie algebra $sl_2(K)$ and by the associative algebra $M_2(K)$, in characteristic 0. When S is a special Jordan algebra (that is a vector subspace of A closed under the Jordan product), Drensky [1] obtained a basis of the weak identities of the pair $(M_2(K), H_2(K))$, where $H_2(K)$ denotes the 2×2 symmetric matrices.

The purpose of the talk is discuss basis of identities of pairs and the techniques used to obtain them. Also we are interested in the asymptotic behavior of the sequences of codimensions and the existence of PI exponent for pairs (A, S) . This is related to the Amitsur's conjecture that is valid in the associative case, for finite dimensional Lie algebras and for identities of finite dimensional of Lie algebras.

Under some restrictions a partial analogue of Kemer's theory for pairs can be developed (see [4]). As consequence, we obtain that the Amitsur's conjecture is valid for the Grassmann envelope of pairs (A, S) where S is a simple Lie or Jordan algebra (see [3]). On the other hand, in the case of S is a Lie algebra, we present a pair such that its PI exponent (if it exists) cannot be an integer (see [4]).

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References

- [1] V. S. Drensky, *Weak identities in an algebra of symmetric matrices of order two*, Pliska Stud. Math. Bulgar. 8 (1986), 77–84 (Russian).
- [2] Yu. P. Razmyslov, *Identities of algebras and their representations*, Translations of Math. Monographs 138, Amer. Math. Soc., Providence, RI, 1994.
- [3] D. L. da Silva Macedo, C. Fideles and P. Koshlukov, *Codimension growth and existence of PI exponent of pairs (associative algebra, vector space)*, submitted.
- [4] D. L. da Silva Macedo and P. Koshlukov, *Codimension growth for weak polynomial identities, and non-integrality of the PI exponent*. Proc. Edinburgh Math. Soc. 63 (4), 929–949, (2020).