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On Almost Nilpotent Varieties with Integer PI-Exponent

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We study almost nilpotent varieties of algebras over a field of zero characteristic. Earlier in the class of algebras with identical relation $x(yz) \equiv 0$ and in the class of all commutative metabelian algebras countable sets of varieties with integer PI-exponent were defined. Only the existence of almost nilpotent subvariety in each defined variety was proved. In the paper by means of combinatorial methods and methods of the representation theory of symmetric groups we prove that earlier defined varieties are almost nilpotent. By analogy with commutative case we define a countable set of almost nilpotent varieties with integer PI-exponent in the class of anticommutative metabelian algebras. For each variety in the corresponding relatively free algebra we study multilinear part as a module of the symmetric group. More precisely we define restrictions on the shape of Young diagrams that correspond to nonzero irreducible submodules. For such diagrams we also obtain the form of nonzero monomials from the corresponding spaces of multihomogeneous elements. We give the detailed description of the results obtained for the algebras satisfying the identity $x(yz) \equiv 0$. Since similar results for commutative and anticommutative metabelian algebras were obtained by analogy we present them without proofs but with remarks.

Key words: polynomial identity, almost nilpotent variety, codimension growth.

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