

On the classification of commutative nilalgebras of dimension at most four.

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The problem of nilpotence in a commutative power-associative algebra is known as the problem of Albert (1948): Every commutative finite dimensional power associative nilalgebra is nilpotent.

Suttles in 1972 (A counterexample to a conjecture of Albert, *Notices Amer. Math. Soc.* 19, A-566), give an example of a commutative five dimensional power associative nilalgebra of nilindex 4 which is solvable and not nilpotent, thus showing Albert's conjecture to be false and forcing a new reformulation of the conjecture. Therefore what is now really known by the Albert conjecture is whether any commutative finite dimensional power associative nilalgebra is solvable.

Gerstenhaber and Myung (On commutative power-associative nilalgebras of low dimension, *Proc. A. M. S.* 48 (1975), 29-32) prove that any commutative power associative nilalgebra of nilindex 4 and dimension 4 is nilpotent. $\text{Char}(F) \neq 2$.

Correa and Suazo (On a class of commutative power-associative nilalgebras, *J. of Algebra.* 215, (1999), 412-417) prove that any commutative power-associative nilalgebra of nilindex n and dimension n is nilpotent. $\text{Char}(F) \neq 2, 3$. Thus, Gerstenhaber and Myung's result follows.

Correa, Hentzel and Labra (On nilpotence of commutative right nilalgebras of low dimension, *International J. of Math, Game Theory and Algebra* 13, (2003), 199-200) prove that any commutative nilalgebra of nilindex 4 and dimension 4 is nilpotent. $\text{Char}(F) \neq 2, 3$. They do not assume power-associativity.

Moreover, Gerstenhaber and Myung determined the class of isomorphisms of commutative power associative nilalgebras of nilindex four and dimension four. They found one family of algebras parameterized by $F^\times / (F^\times)^2$ and 5 individuals algebras of which 2 are associative. In this talk we deal only with commutative nilalgebras of nilindex four and dimension at most four, over infinite fields of $\text{char}(F) \neq 2$ and we do not assume power associativity. We give a clasification of commutative nilalgebras of nilindex four and dimension at most four over quadratically closed fields. This is a joint work with Alberto Elduque of Universidad de Zaragoza, Spain.

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