

## The $\mathbb{Z}$ -gradings on the Grassmann algebra and Arithmetic tools

Claudemir Fideles Bezerra Jr.

Federal University of Campina Grande, and University of São Paulo, Brazil

claudemir@mat.ufcg.edu.br

The Grassmann algebra  $E$  of an infinite-dimensional vector space  $L$  is one of the most important algebras satisfying a polynomial identity. The celebrated papers of Kemer have it as a key ingredient. In this talk, we will introduce the structures of gradings on  $E$  whose support coincides with a subgroup of the group  $\mathbb{Z}$ . We present in more details the so-called 2 and 3-induced  $\mathbb{Z}$ -gradings on  $E$ . In these cases, we provide a better criterion for their supports, and we describe the graded identities in all of them. As a consequence of this fact we give examples of  $\mathbb{Z}$ -gradings on  $E$  which are PI-equivalent but not  $\mathbb{Z}$ -isomorphic. This is the first example of graded algebras with infinite support that are PI-equivalent and not isomorphic as graded algebras. We strongly use Elementary Number Theory as a tool, providing an interesting connection between this area and PI-Theory. Our results are new and this is a joint work with A. Guimarães (UFRN), A. Brandão (UFCG) and P. Koshlukov (UNICAMP).

### References

- [1] A. Guimarães, A. Brandão, C. Fidelis,  *$\mathbb{Z}$ -gradings of full support on the Grassmann algebra*, submitted.
- [2] A. Guimarães, C. Fidelis, P. Koshlukov, *A note on  $\mathbb{Z}$ -gradings on the Grassmann algebra and Elementary Number Theory*, in preparation.