

Gradings on the algebra of upper triangular matrices and their graded identities

Onofrio M. Di Vincenzo*

Dipartimento di Matematica

Università degli Studi di Bari, 70125 Bari, Italy

e-mail divincenzo@dm.uniba.it

Plamen Koshlukov

IMECC, UNICAMP, Cx. P. 6065

13083-970 Campinas, SP, Brazil

e-mail plamen@ime.unicamp.br

Angela Valenti

Dipartimento di Matematica e Applicazioni

Università di Palermo, 90123 Palermo, Italy

e-mail avalenti@math.unipa.it

Let K be an infinite field and let $UT_n(K)$ denote the algebra of $n \times n$ upper triangular matrices over K . We describe all elementary gradings on this algebra. Further we describe the generators of the ideals of graded polynomial identities of $UT_n(K)$ and we produce linear bases of the corresponding relatively free graded algebras. We prove that one can distinguish the elementary gradings by their graded identities. We describe bases of the graded polynomial identities in several “typical” cases. Although in these cases we consider elementary gradings by cyclic groups, the same methods serve for elementary gradings by any finite group.

*2000 Mathematics Subject Classification. Primary 16R10, 16W50, 16R50