

# On the factorability of $T_{C_{p^n}}$ -ideals of $C_{p^n}$ -graded upper block triangular matrix algebras

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**Abstract.** Let  $F$  be a field of characteristic zero. In 2003, Giambruno and Zaicev proved that the  $T$ -ideal of any upper block triangular matrix algebra  $UT(d_1, \dots, d_m)$  satisfies the factoring property, that is,  $\text{Id}(UT(d_1, \dots, d_m)) = \text{Id}(M_{d_1}(F)) \cdots \text{Id}(M_{d_m}(F))$ .

If  $F$  is an algebraically closed field and  $G := C_k$  is a cyclic group of order  $k$ , consider a  $G$ -graded upper block triangular matrix algebra  $UT_G(A_1, \dots, A_m)$  equipped with an elementary  $G$ -grading, where  $A_1, \dots, A_m$  are finite dimensional  $G$ -simple  $F$ -algebras. In 2019, in a joint work with Avelar and Di Vincenzo, we have stated that the  $T_{C_2}$ -ideal of  $UT_{C_2}(A_1, \dots, A_m)$  is factorable if, and only if, there exists at most one index  $i \in [1, m]$  such that  $A_i$  is a non- $C_2$ -regular simple superalgebra, if and only if,  $UT_{C_2}(A_1, \dots, A_m)$  has only one class of  $C_2$ -graded isomorphism.

Recently, in a joint work with Di Vincenzo and Pinto, we have stated a generalization of such results for the  $T_G$ -ideals of the upper block triangular matrix algebras  $UT_G(A_1, \dots, A_m)$ , in case  $G$  is a finite cyclic  $p$ -group with  $p$  being a prime number.

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