On Dixmier-Duflo isomorphism in positive characteristic - the classical nilpotent case

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Abstract

Let $\mathfrak{g}$ be the nil radical of the Borel subalgebra of one of the classical simple Lie algebras over a field F of characteristic $p \geq 0$. For $p > 0$ we find an explicit realization of the center $Z(\mathfrak{g})$ of the enveloping algebra $U(\mathfrak{g})$ by generators and relations. This constructive approach yields an explicit isomorphism between $Z(\mathfrak{g})$ and the polynomial invariants algebra $S(\mathfrak{g})^{\mathfrak{g}}$. While realizing $Z(\mathfrak{g})$, we also prove that $Z(\mathfrak{g})$ is a complete intersection ring. Moreover, it leads to an explicit realization of $Z(\mathfrak{g})$ and $S(\mathfrak{g})^{\mathfrak{g}}$ for $p = 0$ as well. This extends a result of Dixmier in type A_n.