Invariant subalgebras in a skew-group ring and their modules

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Abstract

I. Gelfand and M. Zeitlin constructed a basis in finite dimensional $\mathfrak{gl}_n(\mathbb{C})$-modules together with explicit formulas for $\mathfrak{gl}_n(\mathbb{C})$-action. These formulas for $\mathfrak{gl}_n(\mathbb{C})$-action are called *classical Gelfand-Zeitlin formulas*. Later it was noticed by I. Gelfand and M. Graev that the classical Gelfand-Zeitlin formulas may be used to obtain a family of infinite dimensional $\mathfrak{gl}_n(\mathbb{C})$-modules. More general theory of the so-called Gelfand-Zetlin modules is developed by Yu. Drozd, S. Ovsienko and V. Futorny.

The main difficulty here was to construct and classify so-called singular Gelfand-Zeitlin modules. That is Gelfand-Zeitlin modules where the (rational) coefficients of the classical Gelfand-Zeitlin formulas have potential singularities. A significant step in this direction was done in 2017-2018 by L. Ramirez, P. Zadunaisky and by N. Early, V. Mazorchuk, E.V. We will discuss our most recent paper with V. Mazorchuk that is devoted to a generalization of this construction to any invariant subalgebras in a skew-group ring.