

Knight, Harold

Spectra of tensor products of finite dimensional representations of Yangians. (English)

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The author generalizes the notion of character of representations in the case of representations of Yangians. Let V be a finite-dimensional representation of the Yangian $Y(g)$, $\{h_{ik}\}$ canonical generators generating the commutative subalgebra H of $Y(g)$, $V = \bigoplus_{\beta} V_{\beta}$, where V_{β} is a generalized eigenspace for h_{ik} ($V_{\beta} = \text{Ker}(h_{ik} - \beta I)^r$ for some r); d_{ik}^{β} generalized eigenvalues such that $h_{ik} - d_{ik}^{\beta} I$ acts nilpotently on V_{β} . For each sequence $\beta = (\beta_1, \dots, \beta_n)$ define $\beta(u_1, \dots, u_n) = \prod_{i=1}^n \beta_i(u_i)$, where $\beta_i(u_i) = 1 + \sum_{k=1}^{\infty} d_{ik}^{\beta} u_i^{-k-1}$. Consider the group $L_n = \{f(u_1, \dots, u_n) = \prod_{i=1}^n f_i(u_i)\}$ over all possible Laurent series f_i with the usual multiplication of Laurent series. The group algebra $\mathbb{C}[L_n]$ has as a basis the set of formal exponentials $\{e(f(u_1, \dots, u_n))\}$ with multiplication

$$e(f(u_1, \dots, u_n))e(g(u_1, \dots, u_n)) = e(f(u_1, \dots, u_n)g(u_1, \dots, u_n)).$$

If V is a finite-dimensional representation of $Y(g)$ then the character $\text{ch}(V)$ is an element of the group $\mathbb{C}[L_n]$ given by $\text{ch}(V) = \sum_{\beta} \dim(V_{\beta})e(\beta(u_1, \dots, u_n))$. The author proves the following results:

(1) Let A be a finite-dimensional representation of $Y(g)$, B a subrepresentation, $C = A/B$. Then $\text{ch}(A) = \text{ch}(B) + \text{ch}(C)$.

(2) $\text{ch}(V \otimes W) = \text{ch}(V)\text{ch}(W)$ for finite-dimensional representations V, W .

Finally, the author computes the character of the $(m+1)$ -dimensional representation $W_m(c)$ of $Y(\mathfrak{sl}_2)$ in terms of Drinfeld polynomials.

Reviewer: V.Stukopin (Rostov-na-Donu)

MSC:

17B37 Quantum groups (quantized enveloping algebras) and related deformations

Cited in **1** Review
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Keywords:

character formula; Drinfeld polynomials; representations of Yangians

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