DRINFELD REALIZATION AND ISOMORPHISM OF NEW ADMISSIBLE QUANTUM AFFINE ALGEBRA OF TYPE $B_n^{(1)}$

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Abstract:

To solve the classification and construction of new admissible quantum affine algebras induced by sign-deformations up to isomorphism as pointed Hopf algebra (including the proof of the existence and uniqueness theorems of PBW basis and its canonical basis, as well as the specific constructions for various types). Based on the study of admissible quantum affine algebra of type $A_1^{(1)}$,We explored the structure of the new admissible quantum affine algebra of type $B_n^{(1)}$ (including finite type), which mainly includes the following contents:

(1) We propose an admissible structure matrix and construct a class of new admissible quantum affine algebra of type $B_n^{(1)}$. We show that it is no isomorphic to the standard affine quantum algebra of Drinfeld-Jimbo type(also not isomorphic as algebras).

(2) We generalize the action of Weyl group on the root system to the level of root vectors, and obtain the quantum Weyl group, then prove that it is an automorphic subgroup of the admissible quantum affine algebra we constructed.

(3) For the new admissible quantum affine algebra, we find an effective combination method to obtain the quantum affine root vectors by introducing Lyndon words and quantum affine Lie brackets. In this way, we construct a quantum affine Lyndon convex basis, which is also a complete description of the quantum affine algebraic convex PBW basis.

(4) We give the Drinfeld realization of the new admissible quantum affine algebra, that is, we give a set of Drinfeld generators and Drinfeld generating relations. It can be shown that these Drinfeld generation relations are self-compatible under the defined antiautomorphism. Therefore, we obtain the Drinfeld isomorphism, and give the complete proof of Drinfeld isomorphism theorem by means of combination.