

A compact presentation for the alternating central extension of the positive part of $U_q(\widehat{\mathfrak{sl}}_2)$

Paul M. Terwilliger * 

*Department of Mathematics, University of Wisconsin,
480 Lincoln Drive, Madison, WI 53706-1388 USA*

Received 6 July 2021, accepted 24 August 2021, published online 9 June 2022

Abstract

This paper concerns the positive part U_q^+ of the quantum group $U_q(\widehat{\mathfrak{sl}}_2)$. The algebra U_q^+ has a presentation involving two generators that satisfy the cubic q -Serre relations. We recently introduced an algebra \mathcal{U}_q^+ called the alternating central extension of U_q^+ . We presented \mathcal{U}_q^+ by generators and relations. The presentation is attractive, but the multitude of generators and relations makes the presentation unwieldy. In this paper we obtain a presentation of \mathcal{U}_q^+ that involves a small subset of the original set of generators and a very manageable set of relations. We call this presentation the compact presentation of \mathcal{U}_q^+ .

Keywords: q -Onsager algebra, q -Serre relations, q -shuffle algebra, tridiagonal pair.

Math. Subj. Class. (2020): 17B37, 05E14, 81R50

*The author thanks Pascal Baseilhac for many conversations about U_q^+ and its central extension \mathcal{U}_q^+ . The author thanks Kazumasa Nomura for giving this paper a close reading and offering many valuable comments.

E-mail address: terwilli@math.wisc.edu (Paul M. Terwilliger)

Kompaktna prezentacija alternirajoče središčne razširitve pozitivnega dela $U_q(\widehat{\mathfrak{sl}}_2)$

Paul M. Terwilliger * 

*Department of Mathematics, University of Wisconsin,
480 Lincoln Drive, Madison, WI 53706-1388 USA*

Prejeto 6. julija 2021, sprejeto 24. avgusta 2021, objavljeno na spletu 9. junija 2022

Povzetek

Ta članek obravnava pozitivni del U_q^+ kvantne grupe $U_q(\widehat{\mathfrak{sl}}_2)$. Algebra U_q^+ ima prezentacijo z dvema generatorjema, ki zadoščata kubičnim q -Serrejevim relacijam. Nedavno smo vpeljali algebro \mathcal{U}_q^+ , ki se imenuje alternirajoča središčna razširitev U_q^+ . To razširitev \mathcal{U}_q^+ smo predstavili z generatorji in relacijami. Ta prezentacija je sicer privlačna, toda zaradi velikega števila generatorjev in relacij težko obvladljiva. V tem članku prikažemo prezentacijo \mathcal{U}_q^+ z majhno podmnožico prvotne množice generatorjev in zlahka obvladljivo množico relacij. To prezentacijo imenujemo kompaktna prezentacija \mathcal{U}_q^+ .

Ključne besede: q -Onsagerjeva algebra, q -Serrejeve relacije, q -drsna algebra, tridiagonalni par.

Math. Subj. Class. (2020): 17B37, 05E14, 81R50

*Avtor se zahvaljuje Pascalu Baseilhacu za številne razgovore v zvezi z U_q^+ in njeno središčno razširitvijo \mathcal{U}_q^+ . Avtor se zahvaljuje Kazumasa Nomuri za natančno branje tega članka in za številne dragocene pripombe.
E-poštni naslov: terwilli@math.wisc.edu (Paul M. Terwilliger)