

**THE CYLINDRICAL NATURE OF DRINFELD-JIMBO
QUANTUM GROUPS AND THE ORIGIN OF
TRIGONOMETRIC K -MATRICES**

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Abstract:

The theory of quantum groups is partly motivated by the study of matrix solutions of the parameter-dependent Yang–Baxter equation. For a given quantized universal enveloping algebra of an affine Lie algebra, Drinfeld achieved a key result in 1987: introducing shifts in the loop parameter z , the universal R -matrix has a well-defined action on tensor products of finite-dimensional modules as a formal power series. Furthermore, if both modules are irreducible, the action essentially depends rationally on z .

The reflection equation, the type B analogue of the Yang–Baxter equation, has been studied since the 1980s and is closely associated to monoidal categories with cylinder braiding. In recent joint work (2020, 2022), Andrea Appel and I show the existence of a universal solution of a (generalized) reflection equation, called universal K -matrix, for a given quantum symmetric pair, as defined by Letzter and Kolb. In the affine case, there is a “cylindrical” version of Drinfeld’s argument, yielding matrix-valued formal Laurent series in z which simplify to rational functions on irreducible modules.