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Examples of Compact Matrix Pseudogroups Arising from the Twisting Operation

N. Andruskiewitsch★ **and B. Enriquez**

Centre de Mathématiques, École Polytechnique, F-91128 Palaiseau, France

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Abstract. We construct multiparameter compact matrix pseudogroups of all types and show their representation theories are the same as their classical analogs.

Introduction

This paper is concerned with the problem of constructing families of multiparameter quantum groups. This problem was first raised in [M1] and subsequently treated in [T, Re1, OY, H, LS].

In [Dr3], Drinfeld gave a method to "twist" quasi-Hopf algebra structures. This idea was used by Reshetikhin to give multiparameter examples of quasi-triangular Hopf algebras, at the formal level. He also constructed the corresponding bialgebras (over **C**) of rational functions on the quantum group (cf. [Re1]). He works with a complex simple Lie algebra with fixed Cartan decomposition; the parameter space for these deformations is the second exterior power of the Cartan subalgebra.

The first purpose of this work is to give complex versions of these Hopf algebras, the parameter q being positive $\neq 1$ (Sect. 4). We also construct the Hopf algebras of rational functions (Sect. 5), using the results of [A].

We then find out the conditions for these algebras to yield compact matrix pseudogroups in the sense of [W1] (CMP) (Sect. 5). The test for that is clear from the Tannakian viewpoint: some representation of the quantized enveloping algebra should bear an invariant inner product. The existence of this product in the twisted case follows from the results of Rosso (in the classical case), the first author (in the classical and E_6, E_7 cases) and Tiraboschi (in the G_2, F_4, and E_8 ones). We thus obtain non-simply connected versions of the quantum groups considered by Levendorskii and Soibelman. (Note that the existence of an invariant inner product remains implicit in [LS]).

★ Work partially supported by CONICET and FAMAF (Argentina). Current Address: Max-Planck-Institut für Mathematik, Gottfried-Claren-Strasse 26, W-5300 Bonn 3, FRG