



QUANTIZATION (MATRIX REGULARIZATION) OF LIE-POISSON ALGEBRA

JUMPEI GOHARA and AKIFUMI SAKO

Communicated by Mayeul Arminjon

We provide a quantization (matrix regularization) of Lie-Poisson algebras (linear Poisson algebras) on the algebraic varieties defined by their Kashmir polynomials. In order to define the matrix regularization of the quotient space by the ideal generated by the Kashmir polynomials, we take a fixed reduced Gröbner basis of the ideal. The Gröbner basis determines remainders of polynomials. The operation of replacing this remainders with representation matrices of a Lie algebra roughly corresponds to a weak matrix regularization.

MSC: 81R60, 81S10, 17B63, 81T32

Keywords: Fuzzy space, Lie-Poisson algebra, matrix regularization, noncommutative geometry, quantization

Contents

1	Introduction	19
2	Weak Matrix Regularization for Coordinate Polynomial Rings	21
3	(Weak) Matrix Regularization for Lie-Poisson Varieties	24
3.1	Formulation of Quantization via Enveloping Algebra	25
3.2	(Weak) Matrix Regularization for Lie-Poisson Varieties $A_g/I(C)$	26
4	Summary	29
	References	29

1. Introduction

In string theory, it has been proposed for a long time that matrix models give their constructive formulation. Naturally, their physical quantities of classical solutions, etc. are given as matrices [13]. If we assume that the universe we live in can be