Solution of Yang-Baxter equation and construction of Novikov Lie algebras

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Abstract

In this note we review a method of construction of Novikov algebra on solvable Lie algebras.

1 Introduction

Novikov algebras is a special kind of a pre-Lie algebras, or left-symmetric algebras, arising in many contexts in mathematics and physics. Novikov algebras were introduced in the studies of Hamiltonian operators and Poisson brackets of hydrodynamic type [1, 2]. They are closely related to many topics in mathematical physics and geometry, including Lie groups [3, 9], Lie algebras[5, 7, 9], affine manifolds [4], vector fields [6], and vertex and conformal algebras [4]. Novikov algebras form a subclass of the class of left-symmetric algebras [5, 7, 9]. In particular, they are Lie-admissible algebras, which are important in some physical applications, such as quantum mechanics and hadronic structures. In other words, if A is a left-symmetric algebra (such as a Novikov algebra), then A gives rise to a Lie algebra whose Lie bracket is the commutator bracket, $[x, y] = xy - yx$ for $x, y \in A$.

2 A review on classical Yang-Baxter equation and results

Let F be a field of characteristic zero.

Definition 2.1 *Suppose an algebra $(A, .)$ over F satisfies the following condition:*

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