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Hidden Quantum Group Symmetry and Integrable Perturbations of Conformal Field Theories*

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Abstract. The hidden quantum group symmetry in the quantum Sine-Gordon model is found. This symmetry provides the possibility to restrict the operator algebra of the model to subalgebras. It is shown that these subalgebras are massive deformations of minimal conformal field theories.

Contents

Introduction 157
0. Quantum Group $SL(2)_q$ 158
1. $SL(2)_q$ Invariance of Sine-Gordon Models. 162
2. Reductions of Sine Gordon for Rational ξ/π 168
3. Ultraviolet Limit of RSG 173
References 177

Introduction

The goal of the present paper is to describe an interesting property of certain integrable models: Invariance with respect to the action of quantum groups. This invariance is essentially the quantum effect and provides the possibility to restrict the operator algebra of the models to subalgebras. Most importantly ultraviolet asymptotics of Green functions in the restricted subalgebras are described by conformal field theories [1] different from the one associated to the model itself.

In this paper we concentrate on the case of quantum Sine-Gordon (SG) model [2]. The model is described by the Lagrangian

$$\mathscr{L} = \int (\tfrac{1}{2}(\partial_\mu \varphi)^2 + m^2 \cos \sqrt{\gamma}\varphi)\, dx.$$

We use the renormalized coupling constant $\xi = (\pi\gamma)/(8\pi - \gamma)$. The spectrum of the models contains solitons and (for $\xi < \pi$) their bound states—breathers [3, 4]. From the viewpoint of papers [5–7], SG is the perturbation of the conformal field theory

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