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Orbifold Subfactors from Hecke Algebras

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Abstract: We apply the notion of orbifold models of $SU(N)$ solvable lattice models to the Hecke algebra subfactors of Wenzl and get a new series of subfactors. In order to distinguish our subfactors from those of Wenzl, we compute the principal graphs for both series of subfactors. An obstruction for flatness of connections arises in this orbifold procedure in the case $N = 2$ and this eliminates the possibility of the Dynkin diagrams D_{2n+1}, but we show that no such obstructions arise in the case $N = 3$. Our tools are the paragroups of Ocneanu and solutions of Jimbo–Miwa–Okado to the Yang–Baxter equation.

0. Introduction

A connection between solvable lattice models in statistical mechanics and subfactors in the theory of von Neumann algebras was soon realized after the pioneering work of Jones [Jo] on subfactors, see for example [EL]. Subsequently the theory of subfactors has had striking relations with knot theory, conformal field theory, quantum groups and so on (cf. [Ji, Kn, YG]). Recently the idea of an orbifold of a solvable lattice model has been studied by [DZ, FG, Ko], borrowing from the notion of an orbifold model in conformal field theory of [DHVW], who considered string propagation on toroidal orbifolds. In this paper we study the relation of subfactors to solvable lattice models, and apply the idea of orbifold lattice models to the subfactors of Wenzl [We] to get a new series of irreducible subfactors with the same index as the subfactors of Wenzl. Recall that his subfactors arise from representations of the Hecke algebra of type A and correspond to work of Jimbo–Miwa–Okado [JMO1, JMO2] in solvable lattice model theory, and also to the quantum groups $U_q(sl_k)$ and the 2-variable polynomial link invariant of [FYHLMO].

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