Markov Traces and II₁ Factors in Conformal Field Theory

Jan de Boer* and Jacob Goeree**

Institute for Theoretical Physics, Princetonplein 5, P.O. Box 80.006,
NL-3508 TA Utrecht, The Netherlands

Abstract. Using the duality equations of Moore and Seiberg we define for every primary field in a Rational Conformal Field Theory a proper Markov trace and hence a knot invariant. Next we define two nested algebras and show, using results of Ocneanu, how the position of the smaller algebra in the larger one reproduces part of the duality data. A new method for constructing Rational Conformal Field Theories is proposed.

1. Introduction

In the past few years several attempts have been made to find the basic underlying principles and structures governing Rational Conformal Field Theories (RCFT). In one approach, quantum groups are proposed as the underlying algebraic structure of RCFT [21]. In [21] the philosophy is that the quantum group can be seen as the centralizer of a representation of the braid group. This approach is in particular successful for WZW models, where one can compute braid matrices using the analogue of $6j$-symbols. The result of this construction for arbitrary RCFT is, however, unclear.

In another approach, Rational Conformal Field Theories are seen to be intimately related with three-dimensional topological field theories [16, 3]. Here, the Hilbert space associated to a constant time slice with charges in the three-dimensional theory is equal to the space of conformal blocks of a RCFT. The observables of the three-dimensional theory are knotted links whose expectation values can also be computed (as we will show) from RCFT.

---

* (deboer@hutruu51.bitnet)
** (goeree@hutruu51.bitnet)