

Fock Space Representations of Affine Lie Algebras and Integral Representations in the Wess–Zumino–Witten Models

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Abstract. Fock space representations of affine Lie algebras are studied. Explicit forms of correction terms adding to the currents $F_i(z)$ are determined. It is proved that the Sugawara energy-momentum tensor on the Fock spaces is quadratic in free bosons. Furthermore, screening operators are constructed. This implies the existence of generalized hypergeometric integrals satisfying the Knizhnik–Zamolodchikov equation.

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Introduction

Studies of integral representations in conformal field theories are initiated in [DF1, 2]. Following the earlier paper [FeFu1, 2], Dotsenko and Fateev found that conformal blocks in the minimal models introduced in [BPZ] can be represented by generalized hypergeometric integrals. (Throughout the present paper, conformal blocks are those in genus 0.) The paper [TK1] is closely related to this result. Recently, Felder [Fel] has constructed Fock space resolutions of irreducible representations of the Virasoro algebra and made the physical argument in [DF1, 2] precise. His work is also based on the very deep results in [FeFu1, 2]