Form factors and vertex operators in the eight-vertex model at reflectionless points

Department of Clinical Engineering, Suzuka University of Medical Science  
Yas-Hiro Quano  
E-mail: quanoy@suzuka-u.ac.jp, http://www2.suzuka-u.ac.jp/quanoy/quano.htm

Form factors in the eight-vertex model are considered on the basis of the bosonization scheme for the eight-vertex SOS model and vertex-face correspondence. At so-called ‘reflectionless points’, the S-matrix of the eight-vertex model becomes (anti-)diagonal, so that the matter will become simpler than usual. We wish to show that the form factors of some local operators of the eight-vertex model at reflectionless points can be expressed in terms of the sum of theta functions without any integrals.

Form factors are defined by the matrix elements of some local operators. In this talk, we choose $\tilde{\sigma}$ as a local operator. In this case, form factors of the reflectionless eight-vertex model can be expressed in terms of the sum of theta function, actually. The explicit expressions for 4-point form factors are also presented as follows:

\[
(F_{+-+-} + F_{+-+-} + F_{-++-} + F_{-+-+})(u_1, u_2, u_3, u_4) = \prod_{i<j} G_1(u_i - u_j) \prod_{j=1}^{4} G_2(u - u_j) \sum_{\mu=0}^{N} c_{\mu} G_{3}(u_1 - u_1 - 1/2 + r\mu) \times G_4(\frac{u_3 + u_4}{2} - u_1 - 5/2 + r\mu) \prod_{j=2}^{4} G_{5}(u_1 - u_j + 1/2 - r\mu) \frac{[u - u_4 + u_3 + u_2 - u_1 + 1/2 - (r - 1)\mu]_{1}}{[u_1 + u_2 - u_3 - u_4 - 1]/[u_4 - u_3 + 1]/},
\]

where $c_{\mu}$ is a non-zero constant, and $[u]' = [u]|_{r\to r-1}$, $[u]_1 = [u]|_{r=1}$, etc., and

\[
G_1(u) = g_1(z)g_1(x^4z^{-1}), \quad z = x^{2u}, \\
g_1(z) = (z; x^4, x^4, x^{2r-2})_{\infty}(x^{2r+2}; x^4, x^4, x^{2r-2})_{\infty}, \\
G_2(u) = \frac{1}{(x^{-1}z; x^4)_{\infty}(x^2z^{-1}; x^4)_{\infty}}, \quad G_3(u) = (x^{-2}z; x^2)_{\infty}(x^4z^{-1}; x^2)_{\infty}, \\
G_4(u_0) = (x^{-2}z_0; x^{2r-2})_{\infty}(x^{4}z_0^{-1}; x^{2r-2})_{\infty}, \quad z_0 = x^{2u_0}, \\
G_5(v) = (x^{-2}w; x^4, x^{2r-2})_{\infty}(x^{2r+3}w^{-1}; x^4, x^{2r-2})_{\infty}, \quad w = x^{2v}.
\]

References