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 $\widehat{\sigma^z}$ 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:

$$\begin{aligned}
&(F_{+-+-}+F_{+--+}+F_{-++-}+F_{-+-+})(u_1,u_2,u_3,u_4) \qquad (1)\\
= \;& \prod_{i<j} G_1(u_i-u_j)\prod_{j=1}^{4} G_2(u-u_j)\sum_{\mu=0}^{N} c_\mu G_3(u-u_1-\frac{1}{2}+r\mu)\\
\times \;& G_4(\frac{u_3+u_4}{2}-u_1-\frac{5}{2}+r\mu)\prod_{j=2}^{4} G_5(u_1-u_j+\frac{1}{2}-r\mu)\frac{[u-\frac{u_4+u_3+u_2-u_1}{2}+\frac{1}{2}-(r-1)\mu]_1}{[\frac{u_1+u_2-u_3-u_4}{2}-1]'[\frac{u_4-u_3+1}{2}]'},
\end{aligned}$$

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

$$\begin{aligned}
G_1(u) &= g_1(z)g_1(x^4z^{-1}), \qquad z=x^{2u},\\
g_1(z) &= \frac{(z;x^4,x^4,x^{2r-2})_\infty(x^{2r+2}z;x^4,x^4,x^{2r-2})_\infty}{(x^2z;x^4,x^4,x^{2r-2})_\infty(x^{2r}z;x^4,x^4,x^{2r-2})_\infty},\\
G_2(u) &= \frac{1}{(x^{-1}z;x^4)_\infty(x^5z^{-1};x^4)_\infty}, \qquad G_3(u)=(x^{-2}z;x^2)_\infty(x^4z^{-1};x^2)_\infty,\\
G_4(u_0) &= (x^{-2}z_0;x^{2r-2})_\infty(x^4z_0^{-1};x^{2r-2})_\infty, \qquad z_0=x^{2u_0},\\
G_5(v) &= \frac{(x^{2r-1}w;x^4,x^{2r-2})_\infty(x^{2r+3}w^{-1};x^4,x^{2r-2})_\infty}{(x^{-1}w;x^4,x^{2r-2})_\infty(x^3w^{-1};x^4,x^{2r-2})_\infty}, \qquad w=x^{2v}.
\end{aligned}$$

References

[1] Lashkevich M and Quano Y.-H: Form factors in the eight-vertex model at reflectionless points, in preparation.