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Correlation function and thermodynamics of XXZ chain

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Brief Introduction of Prof. Takahashi

- Bachelor of Liberal Arts, Univ. of Tokyo, 1967
- Master of Science, Univ. of Tokyo, 1969
- Doctor of Science, Univ. of Tokyo, 1972

Prof. Takahashi is the fellow of Physical Society of Japan and American Physical Society. He is a world well known experts in the field of integrable systems and condensed matter physics. He has been serving as Vice-Chief Editor of a Journal of Physical Society of Japan 2001-2003 and member of editorial board of this journal (1991-2001).

Abstract: **The calculation of the correlation functions of Bethe ansatz solvable models is very difficult problem. Among these solvable models spin 1/2 XXX chain has been investigated for a long time. Even for this model only the nearest neighbor and the second neighbor correlations were known. In 1990's multiple integral formula for the general correlations is derived. But the integration of this formula is also very difficult problem.**

Recently these integrals are decomposed to products of one dimensional integrals and at zero temperature, zero magnetic field and isotropic case, correlation functions are expressed by *log 2* and Riemann's zeta functions with odd integer argument ζ(3), ζ(5), ζ(7), ... We can calculate density submatrix of successive seven sites. Entanglement entropy of seven sites is calculated. These method can be extended to XXZ chain up to *n=4*. Correlation functions are expressed by the generalized zeta functions.

Several years ago I derived new thermodynamic Bethe ansatz equation for XXZ chain. This is quite different with Yang-Yang type thermodynamic Betha ansatz equations and contains only one unknown function. This equation is very useful to get the high temperature expansion.

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