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Diagonal Ising correlation functions and quasimodular forms

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Abstract

The two-point correlation functions, $C(N, N)$, of the square lattice Ising model in the case of diagonal separation are known from work of Miwa and Jimbo to satisfy a form of the Painlevé VI equation. The general correlation functions, $C(M, N)$, were evaluated as a form factor expansion by Wu, McCoy, Tracy, and Barouch. A parameter λ may be introduced to keep track of different terms in the form factor expansion, which results in a more general solution to Miwa and Jimbo’s Painlevé VI equation in the diagonal case. We will show that this solution can be written as a finite sum of terms. Each term is the product of two factors, one of which contains the λ dependence and involves theta functions, the other of which is a quasimodular form.