

Mathematical Physics

Periodic Ising Correlations

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In this paper, we first rework B. Kaufman's 1949 paper, "Crystal Statistics. II. Partition Function Evaluated by Spinor Analysis", by using representation theory. Our approach leads to a simpler and more direct way of deriving the spectrum of the transfer matrix for the finite periodic Ising model. We then determine formulas for the spin correlation functions that depend on the matrix elements of the induced rotation associated with the spin operator in a basis of eigenvectors for the transfer matrix. The representation of the spin matrix elements is obtained by considering the spin operator as an intertwining map. We exhibit the "new" elements V_+ and V_- in the Bugrij-Lisovyy formula as part of a holomorphic factorization of the periodic and anti-periodic summability kernels on the spectral curve associated with the induced rotation for the transfer matrix.

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