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LOW-TEMPERATURE SERIES EXPANSIONS FOR SQUARE-LATTICE ISING MODEL WITH FIRST AND SECOND NEIGHBOUR INTERACTIONS

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Abstract

We have calculated the low-temperature series expansions of the spontaneous magnetization and the zero-field susceptibility of the square-lattice ferromagnetic Ising model with first-neighbour interaction J1 and second-neighbour interaction J2 to the 30th and 26th order respectively by computer. Our results extend the previous calculations by Lee and Lin to six more orders. We use the Padé approximants to estimate the critical exponents and the critical temperature for different ratios of R = J2/J1. The estimated critical temperature as a function of R agrees with the estimation by Oitmaa from high-temperature series expansions.

Key words：Ising model; Low temperature series expansions