Ground-State Phase Diagram of Transverse Spin-2 Ising Model with Longitudinal Crystal-Field

ZHAO Jie,[1,2] WEI Guo-Zhu,[1] and XU Xing-Guang[1,2]

[1] College of Science, Northeastern University, Shengyang 110006, China
[2] College of Science, Liaoning University of Petroleum & Chemical Technology, Fushun 113001, China

Abstract: The transverse spin-2 Ising ferromagnetic model with a longitudinal crystal-field is studied within the mean-field theory based on Bogoliubov inequality for the Gibbs free energy. The ground-state phase diagram and the tricritical point are obtained in the transverse field Ω/zJ-longitudinal crystal D/zJ field plane. We find that there are the first order-order phase transitions in a very small range of D/zJ besides the usual first order-disorder phase transitions and the second order-disorder phase transitions.

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