

Critical Behavior of the Gaussian Model with Periodic Interactions on Diamond-Type Hierarchical Lattices in External Magnetic Fields

LIN Zhen-Quan,¹ KONG Xiang-Mu,² JIN Jin-Shuang¹ and YANG Zhan-Ru^{3,4}

¹ Department of Physics, Wenzhou Normal College, Wenzhou 325003, Zhejiang Province, China

² Department of Physics, Qufu Normal University, Qufu 273165, Shandong Province, China

³ CCAST (World Laboratory), P.O. Box 8730, Beijing 100080, China

⁴ Department of Physics and Institute of Theoretical Physics, Beijing Normal University, Beijing 100875, China

(Received: 2000-8-29; Revised:)

Abstract: The Gaussian spin model with periodic interactions on the diamond-type hierarchical lattices is constructed by generalizing that with uniform interactions on translationally invariant lattices according to a class of substitution sequences. The Gaussian distribution constants and imposed external magnetic fields are also periodic depending on the periodic characteristic of the interaction bonds. The critical behaviors of this generalized Gaussian model in external magnetic fields are studied by the exact renormalization-group approach and spin rescaling method. The critical points and all the critical exponents are obtained. The critical behaviors are found to be determined by the Gaussian distribution constants and the fractal dimensions of the lattices. When all the Gaussian distribution constants are the same, the dependence of the critical exponents on the dimensions of the lattices is the same as that of the Gaussian model with uniform interactions on translationally invariant lattices.

PACS: 75.10.Hk, 05.50.+q

Key words: Gaussian model, critical phenomena, periodic interactions, Gaussian distribution constants, diamond-type hierarchical lattices, renormalization group

[\[Full text: PDF\]](#)

Close