Tsallis scaling in the long-range Ising chain with competitive interactions

http://www.firstlight.cn 2009-08-31

A numerically efficient transfer matrix approach is used to investigate the validity of the Tsallis scaling hypothesis in the long-range Ising spin chain with competitive interactions. In this model, the interaction between two spins i and j placed r lattice steps apart is Ji; j = (? 1)z (i; j)J0=ra, where z(i; j) is either 0 or 1. This procedure has succeeded to show the validity of the scaling hypothesis for the well investigated ferromagnetic version

of the model, i.e., z(i; j) = 0;8i; j, 8a 0. Results are reported for some models of a set, which is defined by requiring z(i; j) to be a periodic sequence of 00s and 10s. As expected from symmetry arguments, we find that the hypothesis is not valid when z(i; j) = 1;8i; j and a < 1. However, it is verified, with high degree of numerical accuracy, when a < 1, for sequences in which the occurrence of z(i; j) = 0 is more frequent than that

of z(i; j) = 1.

存档文本

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