The study of Heisenberg magnetic systems using Creutz cellular automaton

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There is a lot of methods devoted to the simulation of thermodynamical properties of magnetic systems. Most of them use the temperature as an input value. In the beginning of eightieth Creutz proposed the model in which temperature is the output value and the spin change possibility is connected to some additional entity responsible for energy accumulation. In the nineties such a model has been successfully used to reproduce the critical properties of Ising model for wide range of dimensionalities. In spite of some limitations concerning the temperature scale in the region of phase transition the results were characterized by very good accuracy.
In this work we present the attempt to study the Heisenberg magnetic model using the approach based on the Creutz cellular automaton. The change of possible spin values spectrum from discrete one to continuous required the different meaning of some basic simulational operations like spin flip or temperature calculation procedure. As a result there are presented the critical properties of Heisenberg model obtained using presented model. The discussion of as well some technical as physical features concerning this way of simulation is included.

9.7 cm

13.4 cm

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