論文内容の要旨

論文題目:

UNCONVENTIONAL PHASE TRANSITIONS
IN CLASSICAL SYSTEMS
WITH GEOMETRICAL FRUSTRATION
(幾何学的フラストレーションを持つ古典系での特異な相転移)

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We investigate effects of geometrical frustration of a classical model in this thesis. A 4-state ferromagnetic Potts model with a special type of frustration on a three dimensional diamond lattice has been proposed as a minimum model for explaining the strange structural phase transition observed in β-pyrochlore KOs_2O_6. We find that the model undergoes unconventional phase transition; the half of the spins order in a two dimensional hexagonal-sheet-like structure, while the remaining half stay random. And the ordered sheets and the random sheets stack one after another.

The phase transition of the present model is of the first order, which is the same as in the KOs_2O_6 systems. However, experimentally no symmetry breaking change is observed. Nevertheless, this kind of unconventional phase transition is interesting from the statistical mechanical point of view, since various anomalous features can be observed in the low temperature phase. For example, there remains a residual entropy. These peculiar features give new interesting issues which is caused by geometrical frustration.