Application of the spin cluster methods for the description of the thermodynamics of the Heisenberg model. GERMAN SAMOLYUK, VLADIMIR ANTROPOV, Ames Laboratory, ISU — We present a general formulation of the spin cluster methods applied to the calculation of thermodynamics of the Heisenberg model in terms of renormalized fields describing interaction between a cluster and its environment. The results of our calculations demonstrate that a pair cluster approximation reproduces Monte-Carlo and spin-dynamic results for the Curie temperature with a rather high accuracy. Such non-mean field systems as systems with the frustrated interactions and systems with a small number of nearest neighbors are investigated. Both classical and quantum Heisenberg model results are obtained. We discuss the general applicability and the enormous computational advantages of this approach. This work was supported by the Office of Basic Energy Sciences of the U.S. Department of Energy under Contract No. W-7405-ENG-82.

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