Random field Ising model on networks with heterogeneous connections

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We study a zero-temperature phase transition in the random field Ising model on scale-free networks with the degree exponent γ. Using an analytic mean field theory, we find that the spins are always in the ordered phase for $\gamma < 3$. On the other hand, the spins undergo a phase transition from an ordered phase to a disordered phase as the dispersion of the random fields increases for $\gamma > 3$. The phase transition is continuous or discontinuous depending on the shape of the random field distribution. Numerical simulations are also performed to confirm the results. We also discuss an implication of this study on an opinion dynamics in social systems.