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Majority-vote model on scale-free hypergraphs

Majority-vote models on scale-free hypergraphs are investigated by means of Monte Carlo simulations with different variants of system dynamics. Hypergraphs are generalization of ordinary graphs in which higher order of social organization is included by introducing hyperedges corresponding to social groups, connecting more than two nodes. In the models under study opinions of agents (two-state spins) placed in nodes are updated according to a probabilistic rule with control parameter representing social noise, and the probability of a single spin flip depends on the average opinion within only one social group (hyperedge) the agent belongs to. This introduces an intermediate level of social interactions, in contrast with the case of networks, where the opinion of agent usually depends on the average opinion of all neighbors. In all cases under consideration a second-order phase transition to a state with an uniform opinion was found as a function of the social noise, with the critical value of the control parameter and the critical exponents depending on the hypergraph topology and details of the system dynamics (node or hyperedge update).