Abstract for Modulated phases in a spin model with Dzyaloshinskii-Moriya interactions

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We analyze the phase diagram of an elementary statistical lattice model of classical, discrete, spin variables, with nearest-neighbor ferro-magnetic isotropic interactions in competition with chiral interactions along an axis. At the mean-field level, we show the existence of para-magnetic lines of transition to a region of modulated (helimagnetic) structures. We then turn to the analysis of the analogous problem on a Cayley tree. Taking into account the simplicity introduced by the infinite-coordination limit of the tree, we explore several details of the phase diagrams in terms of temperature and a parameter of competition. In particular, we characterize sequences of modulated (helical) structures associated with devil's staircases of a fractal character.