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Fluctuation induced first-order phase transitions in a dipolar Ising ferromagnetic slab RAFAEL M. FERNANDES, Brazilian Synchrotron Light Laboratory and IFGW, Unicamp, Brazil, HARRY WESTFAHL JR., Brazilian Synchrotron Light Laboratory — We investigate the size effects on the magnetic phase diagram of an Ising ferromagnetic slab with finite width and finite thickness in which two interactions compete: the short-range strong exchange interaction and the long-range weak dipolar one. We show that the homogeneous ordered state is unstable towards the formation of a modulated phase and that thermal fluctuations induce a first-order Brazovskii transition. By considering striped and bubble modulated configurations, we show that the first has a lower energy and a higher spinodal limit and that in the most stable ordered phase the order parameter is modulated along the limited direction but uniform along the unlimited one. This effect is shown to be a consequence of finite lengths and of Dirichlet boundary conditions in a system with competing interactions. Applications of this model to the domain structure of thin films are discussed, specially for the case of MnAs:GaAs thin films, for which qualitative behaviors of the number of domains and of the mean value of modulation as functions of the temperature are outlined.

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