Camia, Federico; Jiang, Jianping; Newman, Charles M.
A note on exponential decay in the random field Ising model. (English) [Zbl 1401.60175]
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Summary: For the two-dimensional random field Ising model (RFIM) with bimodal (i.e., two-valued) external field, we prove exponential decay of correlations either (i) when the temperature is larger than the critical temperature of the Ising model without external field and the magnetic field strength is small or (ii) at any temperature when the magnetic field strength is sufficiently large. Unlike previous work on exponential decay, our approach is not based on cluster expansions but rather on arguably simpler methods; these combine an analysis of the Kertész line and a coupling of Ising measures (and also their random cluster representations) with different boundary conditions. We also show similar but weaker results for the RFIM with a general field distribution and in any dimension.

MSC:
60K35 Interacting random processes; statistical mechanics type models; percolation theory
82B20 Lattice systems (Ising, dimer, Potts, etc.) and systems on graphs arising in equilibrium statistical mechanics
82B43 Percolation

Keywords:
random field Ising model; exponential decay; random cluster model; coupling; Kertész line

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