

On the Bunkbed conjecture

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Abstract

The bunkbed conjecture (due to Pieter W. Kasteleyn, 1985) is a conjecture in percolation theory, which despite its simplicity is still open, although it had attracted the attention of many researchers in the field (van der Berg, Kahn, Häggström, Linusson, etc).

A “bunkbed graph” is a graph constructed by joining two identical copies of a given graph by “vertical” edges at certain vertices located on top of each other, the name being suggestive for the shape of a bunkbed.

The intuitive statement of the conjecture is that under removal of some of the edges (Bernoulli bond percolation, for example), the probability of two vertices to be connected is a monotone decreasing function of their graph distance, that is, closer points are more likely to remain connected.

In this talk, I will present a survey of some known results on the validity of the conjecture, and I will present some partial results (work in progress with the Ph.D. student A.I. Țacă, Transilvania University of Braşov).