

# Critical value of an anisotropic percolation on $\mathbb{Z}^2$

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## Abstract:

We consider an anisotropic finite-range bond percolation model on  $\mathbb{Z}^2 = \{(x, i) : x, i \in \mathbb{Z}\}$ . For any  $i$  fixed, i.e. in the  $i$ -th horizontal layer, the edges  $\langle (x, i), (y, i) \rangle$  for  $1 \leq |x - y| \leq N$  are open with probability  $1/2N$ . For any  $x$  fixed, the vertical edges connecting two nearest neighbor vertical vertices  $\langle (x, i), (x, i + 1) \rangle$  are open with probability  $\epsilon(N)$ . If  $\epsilon = \kappa N^{-2/5}$ , we see a phase transition in  $\kappa$ : there exist positive constant  $C_1, C_2$  such that when  $\kappa < C_1$ , there is no percolation and when  $\kappa > C_2$ , percolation occurs. This result also partially answered the conjecture proposed by Fontes, Marchetti, Merola, Presutti and Vares (*J. Stat. Phys.* (2015) **161**, 91-123).

Based on joint work with Thomas Mountford and Maria Eulália Vares ([arxiv.org/abs/1904.11030](https://arxiv.org/abs/1904.11030)).