ON GEOMETRICAL PROPERTIES OF RANDOM TORI AND RANDOM GRAPH MODELS

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The theory of random graphs is an important area of the graph theory. It is usually aimed to establish the existence of an object in a noncostructive sense. The use of probabilistic proving techniques is more powerful for this purpose.
There are four known ways to introduce the random graph:

- *static model*
- *dynamic model*
- *probabilistic model*
- *Kolmogorov random model.*

The most frequently used model is the probabilistic one however the Kolmogorov random model became recently quite popular.

We study the properties of random d-dimensional tori in our paper. We denote by T the random d-dimensional torus on n^d vertices. Using probabalistic and Kolmogorov complexity arguments we estimate the upper bound of the size of the d-dimensional grid - the subgraph of the random torus T. We compare both mentioned proving techniques.
It is shown that for largest d-dimensional grid G on r^d vertices (such that $G \subseteq T$) the following inequality holds with very high probability:

$$r \leq (\log n)^{1/d} + O(1).$$

This result holds both for the probabilistic and Kolmogorov random models.

Finally, we comment the obtaining results and give some remarks on possible applications.
One of them is as follows. The presented model can be interpreted as an interconnection network with (random) faulty/overloaded communicational links. Therefore the results can be helpful for design of parallel or distributed systems in which the network topology is represented by any random d-dimensional torus.