Abstract

In the thesis we study selected properties of random coverings of graphs introduced by Amit and Linial in 2002. A random n-covering of a graph G, denoted by $\tilde{G}$, is obtained by replacing each vertex v of G by an n-element set $\tilde{G}_v$ and then choosing, independently for every edge $e = \{x, y\} \in E(G)$, uniformly at random a perfect matching between $\tilde{G}_x$ and $\tilde{G}_y$.

The first problem we consider is the typical size of the largest topological clique in a random covering of given graph G. We show that asymptotically almost surely a random n-covering $\tilde{G}$ of a graph G contains the largest topological clique which is allowed by the structure of G.

The second property we examine is the existence of a Hamilton cycle in $\tilde{G}$. We show that if G has minimum degree at least 5 and contains two edge disjoint Hamilton cycles whose union is not a bipartite graph, then asymptotically almost surely $\tilde{G}$ is Hamiltonian.