

Martin Nehéz

A DETAILED STUDY OF THE DOMINATING CLIQUES PHASE
TRANSITION IN RANDOM GRAPHS

A subset of nodes $S \subseteq V$ of a graph $G = (V, E)$ is a dominating clique if S is a dominating set and a clique of G . The phase transition of dominating cliques in Erdős-Rényi random graph model $G(n, p)$ is investigated in this paper. Lower and upper bounds on the edge probability p for the existence of an r -node dominating clique are established in this paper. We prove therein that given an n -node random graph G from $G(n, p)$ for $r = c \log_{1/p} n$ with $1 \leq c \leq 2$ it holds: (1) if $p > 1/2$ then an r -clique is dominating in G with a high probability and, (2) if $p \leq (3 - \sqrt{5})/2$ then an r -clique is not dominating in G with a high probability. The remaining range of the probability p is discussed with more attention. Within such a range, we provide intervals of r where a dominating clique existence probability is zero, positive but less than one, and one, respectively.