Upper bounds for the α-domination number

Speaker: **Andrei Gagarin**
Jodrey School of Computer Science
Acadia University

Given a graph G and a real number α, $0 < \alpha \leq 1$, a set of vertices $X \subseteq V(G)$ is called an *α-dominating set* of G if at least $\alpha \times 100\%$ neighbors of each vertex of $V(G) - X$ are in X. The minimum cardinality of an α-dominating set of G is called the *α-domination number* $\gamma_\alpha(G)$. For the classical domination number $\gamma(G)$, we have $\gamma(G) \leq \gamma_\alpha(G)$, and $\gamma(G) = \gamma_\alpha(G)$ when α is sufficiently close to 0.

By using a probabilistic method approach, we provide new upper bounds for the α-domination number $\gamma_\alpha(G)$ in terms of parameter α and the graph vertex degrees. The results for $\gamma_\alpha(G)$ generalize two well-known upper bounds for $\gamma(G)$. We introduce the α-rate domination number $\gamma_{\times\alpha}(G)$, which combines the concepts of α-domination and k-tuple domination, and prove two similar upper bounds for $\gamma_{\times\alpha}(G)$. Probabilistic constructions used to prove all these bounds provide randomized algorithms to find corresponding dominating sets. This is joint work with Anush Poghosyan and Vadim Zverovich, University of the West of England (Bristol, UK).