IDENTIFYING CODES IN REGULAR GRAPHS

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An identifying code of a graph G is a dominating set such that the neighbourhood of each vertex within the code is unique. More formally, C is an identifying code if for any pair x, y of vertices of G, $N[x] \cap C \neq \emptyset$ and $N[x] \cap C \neq N[y] \cap C$. They were introduced in [1] and are a variation of other concepts such as *metric bases* or *locating-dominating sets* [3]. Given a graph G, let $\gamma^{\text{ID}}(G)$ denote the *identifying code number* of G, that is, the size of a minimum identifying code of G.

In this talk, we show that the bound $\gamma^{\text{ID}}(G) \leq n - \frac{n}{84d}$ holds for any identifiable d-regular graph G for large enough d. This bound is tight (up to a constant) and asymptotically settles a conjecture of the first author, R. Klasing, A. Kosowski and A. Raspaud [2] for the case of regular graphs. The bound is proved using Lovász' Local Lemma.

We also present sharp bounds for the identifying code number of random d-regular graphs, which is proved to be close to $\frac{\log d}{d} n$ with high probability.

Keywords: Identifying code, Dominating set, Probabilistic method.

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