Mathematics > Combinatorics

Identifying codes in line graphs

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An identifying code of a graph is a subset of its vertices such that every vertex of the graph is uniquely identified by the set of its neighbours within the code. We study the edge-identifying code problem, i.e. the identifying code problem in line graphs. If $\ID(G)$ denotes the size of a minimum identifying code of an identifiable graph G, we show that the usual bound $\ID(G)\ge \lceil\log_2 (n+1)\rceil$, where n denotes the order of G, can be improved to $\Theta (\sqrt{n})$ in the class of line graphs. Moreover, this bound is tight. We also prove that the upper bound $\ID(\mathcal{L}(G))\leq 2|V(G)|-5$, where $\mathcal{L}(G)$ is the line graph of G, holds (with two exceptions). This implies that a conjecture of R. Klasing, A. Kosowski, A. Raspaud and the first author holds for a subclass of line graphs. Finally, we show that the edge-identifying code problem is NP-complete, even for the class of planar bipartite graphs of maximum degree~3 and arbitrarily large girth.

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