

On Efficient Domination for some classes of H -free bipartite graphs

Andreas Brandstädt* (University of Rostock, Germany) and
Raffaele Mosca (University of Pescara, Italy)

A vertex set D in a finite undirected graph G is an *efficient dominating set* (*e.d.s.* for short) of G if every vertex of G is dominated by exactly one vertex of D . The *Efficient Domination* (*ED*) problem, asks for the existence of an e.d.s. in G ; it is the Exact Cover problem for the closed neighborhood hypergraph of G . ED is known to be NP-complete even for very restricted H -free graph classes such as for $2P_3$ -free chordal graphs (and thus, for P_7 -free chordal graphs) while it is solvable in polynomial time for P_6 -free graphs. For H -free graphs, ED is either NP-complete or polynomial, i.e., a dichotomy.

In this talk, we focus on special classes of H -free bipartite graphs. Lu and Tang showed that ED is NP-complete for chordal bipartite graphs and for planar bipartite graphs; actually, ED is NP-complete even for planar bipartite graphs with vertex degree at most 3 and girth at least g for every fixed g . Thus, ED is NP-complete for $K_{1,4}$ -free bipartite graphs and for C_4 -free bipartite graphs. For classes of bounded clique-width, ED is solvable in polynomial time. Dabrowski and Paulusma published a dichotomy for clique-width of H -free bipartite graphs. For instance, clique-width of $S_{1,2,3}$ -free bipartite graphs is bounded.

We show that (weighted) ED can be solved in polynomial time for H -free bipartite graphs when H is P_7 or ℓP_4 for fixed ℓ , and similarly for P_9 -free bipartite graphs with vertex degree at most 3, and when H is $S_{2,2,4}$.