CONSTRUCTION OF A MAXIMUM STABLE SET WITH k-EXTENSIONS

PETER L. HAMMER AND IGOR E. ZVEROVICH

ABSTRACT. A stable set I of a graph G is called *k-extendable*, $k \geq 1$, if there exists a stable set $X \subseteq V(G) \setminus I$ such that $|X| \leq k$ and $|N(X) \cap I| < |X|$. A graph G is called *k-extendable* if every stable set in G, which is not maximum, is k-extendable. Let us denote by $\mathrm{E}(k)$ the class of all k-extendable graphs.

We present a finite forbidden induced subgraph characterization of the maximal hereditary subclass $\mathrm{PE}(k)$ in $\mathrm{E}(k)$ for every $k \geq 1$.

Thus, we define a hierarchy $\mathrm{PE}(1) \subset \mathrm{PE}(2) \subset \cdots \subset \mathrm{PE}(k) \subset \cdots$ of hereditary classes of graphs, in each of which a maximum stable set can be found in polynomial time. The hierarchy covers all graphs, and all its classes can be recognized in polynomial time.

RUTCOR–RUTGERS CENTER FOR OPERATIONS RESEARCH, RUTGERS UNIVERSITY, 640 BARTHOLOMEW RD, PISCATAWAY, NJ 08854-8003, USA

E-mail address: igorzv@rci.rutgers.edu

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