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MR1771399 (2001d:05185) 05C85 (68R10)

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Conic reduction of graphs for the stable set problem. (English summary)

Discrete Math. **222** (2000), *no. 1-3,* 199–211.

The problem of finding a maximum stable (= independent) set of nodes in a graph has been tackled in various ways. One approach consists in using reduction methods, i.e., trying to associate to a given graph G with (unknown) stability number $\alpha(G) = \max\{|S|\colon\ S \text{ a stable set in } G\}$ a graph G^1 with $\alpha(G^1) = \alpha(G) - p$ where p is a known positive integer (usually $p = 1$). Repeated application of the reduction produces a clique and $\alpha(G)$ can be easily obtained.

Lozin introduces a conic reduction which does not increase the number of nodes in the graph and which can be performed in polynomial time. This technique allows a computation of $\alpha(G)$ in polynomial time for a subclass of the graphs G containing no chair (a chair is a claw with two branches of length one and one branch of length two).

An algorithm in $O(n^4)$ time is then given for finding $\alpha(G)$ for a subclass of chair-free graphs characterized by 3 additional forbidden subgraphs (called butterfly, parachute and kite).

Reviewed by *D. de Werra*

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