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**Cheng, Christine; McDermid, Eric; Suzuki, Ichiro**

**Planarization and acyclic colorings of subcubic claw-free graphs.**

Kolman, Petr (ed.) et al., Graph-theoretic concepts in computer science. 37th international workshop, WG 2011, Teplá Monastery, Czech Republic, June 21–24, 2011. Revised papers. Berlin: Springer (ISBN 978-3-642-25869-5/pbk). Lecture Notes in Computer Science 6986, 107-118 (2011).

Summary: We study methods of planarizing and acyclically coloring claw-free subcubic graphs. We give a polynomial-time algorithm that, given such a graph $G$, produces an independent set $Q$ of at most $n/6$ vertices whose removal from $G$ leaves an induced planar subgraph $P$ (in fact, $P$ has treewidth at most four). We further show the stronger result that in polynomial-time a set of at most $n/6$ edges can be identified whose removal leaves a planar subgraph (of treewidth at most four). From an approximability point of view, we show that our results imply 6/5- and 9/8-approximation algorithms, respectively, for the (NP-hard) problems of finding a maximum induced planar subgraph and a maximum planar subgraph of a subcubic claw-free graph, respectively. Regarding acyclic colorings, we give a polynomial-time algorithm that finds an optimal acyclic vertex coloring of a subcubic claw-free graph. To our knowledge, this represents the largest known subclass of subcubic graphs such that an optimal acyclic vertex coloring can be found in polynomial-time. We show that this bound is tight by proving that the problem is NP-hard for cubic line graphs (and therefore, claw-free graphs) of maximum degree $d \geq 4$. An interesting corollary to the algorithm that we present is that there are exactly three subcubic claw-free graphs that require four colors to be acyclically colored. For all other such graphs, three colors suffice.

doi:10.1007/978-3-642-25870-1_11