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Recognizing and Colouring Even-Hole-Free Apple-Free Graphs

A hole is an induced cycle with at least four vertices. An apple is a hole with a pendant edge. We prove that apple-free even-hole-free graphs can be decomposed by clique cutsets into, essentially, unit circular-arc graphs. This is the basis for our algorithms for recognizing and colouring these graphs. Our recognition algorithm is more efficient ($O(nm)$) than known algorithms for recognizing even-hole-free graphs ($O(n^{11})$). Colouring apple-free graphs is NP-hard and the complexity of colouring even-hole-free graphs is unknown, but our algorithm colours apple-free even-hole-free graphs in $O(n^3)$ time. This is joint work with Steven Chaplick and Chính Hoàng.