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Recognizing polar and monopolar graphs

Polar graphs admit a vertex partition into a complete multipartite graph and a P_3-free graph. Special cases of polar graphs are monopolar graphs, in which the complete multipartite graph is a stable set and unipolar graphs, where it is a clique. While recognizing unipolar graphs is efficiently doable for every input graph, checking polarity or monopolarity is hard in general and known to be easy on only few graph classes.

We give new, sharp NP-completeness results; in particular we show that recognizing polar planar and monopolar planar graphs is hard. On the other hand we give positive results for polarity on subclasses of planar graphs. These results rely on a new technique for solving monopolarity on a large graph class.