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ARBORICITY NEARLY BOUNDS DEGENERACY

Arboricity and degeneracy are two fundamental and closely related graph parameters that measure the sparsity of a graph. Every k -degenerate graph is k -arboric, but some k -arboric graphs are only $(2k - 1)$ -degenerate. These basic observations lead to a natural structural question:

How far are k -arboric graphs from being k -degenerate?

Specifically, what are the strongest constraints on the edges removed from a k -arboric graph in order to get a k -degenerate graph? The simplest instance:

Can every 2-arboric graph be made 2-degenerate after removing a matching?

More specifically, a (d, h) -decomposition of a graph G is a partition of its edge set E into two subsets E_1 and E_2 such that:

- edges E_1 span a d -degenerate graph,
- edges E_2 span a h -bounded-degree graph.

Our main result is a characterisation of all possible decomposition types (d, h) that exist for all k -arboric graphs. In particular, we determine whether every k -arboric graph admits a $(k, k - 1)$ -decomposition, that is, a decomposition into a k -degenerate graph and a $(k - 1)$ -bounded-degree graph.

This is joint work with Bartłomiej Bosek, Grzegorz Gutowski, and Jakub Przybyło. It is based on our paper.