

Recent results on b-coloring

Professor Frédéric Maffray
Laboratoire Leibniz
Grenoble, France

Abstract

A b-coloring of a graph is a coloring of its vertices such that every color class contains a vertex that has a neighbour in every other color class. This definition was introduced by Irving and Manlove and inspired by the earlier definition of a-coloring due to Harary and Hedetniemi.

The b-chromatic number of a graph G is the largest integer k such that G admits a b-coloring with k colors. Determining this number is an NP-complete problem, even for bipartite graphs. I will recall some known facts and present new results about b-colorings. The first one is a polynomial-time algorithm that computes the b-chromatic number of any P_4 -free graph. The second one deals with the question of characterizing the so-called b-perfect graphs. A graph G is b-perfect if, for every induced subgraph H of G , the b-chromatic number of H is equal to its chromatic number.

We conjecture that b-perfect graphs are exactly those graphs that do not contain a member of a list of twenty forbidden induced subgraphs, and give evidence for this conjecture by proving it in several special cases (diamond-free graphs, chordal graphs).