SEMINARIUM
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wtorek, 27 czerwca 2023 r., godz. 12:30, on-line

Majority distinguishing edge colorings

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An edge coloring c of a graph G is called a *majority edge coloring* if for every vertex v of the graph G and every color α at most half of the edges incident with v have the color α. We are interested in finding the smallest possible number of colors in such a coloring. Bock et al. [1] proved that every graph of minimum degree at least two has a majority edge coloring with four colors and this bound is best possible in general. The *distinguishing index* $D'(G)$ of a graph G is the least number d such that G has an edge coloring with d colors that is only preserved by the identity automorphism. Imrich et al. [2] proved that if G is a connected graph with minimum degree at least two, then $D'(G) \leqslant \lceil \Delta(G) \rceil + 1$.

In the talk we present upper bounds on the number of colors in an edge coloring of a graph that is both a majority coloring and a distinguishing coloring. We show a general bound for all graphs of degree at least two and some results for selected classes of graphs. In particular, we show that if G is a traceable graph of minimum degree at least four, then G has a majority distinguishing edge coloring with three colors.

This is joint work with Magdalena Prorok.

[1] F. Bock, R. Kalinowski, J. Pardey, M. Pilśniak, D. Rautenbach, M. Woźniak, *Majority Edge-Colorings of Graphs*, Electronic J. Comb. 30 (2023) #P1.42

[2] W. Imrich, R. Kalinowski, M. Pilśniak, M. Woźniak, *The distinguishing index of connected graphs without pendant edges*, Ars Math. Contemp. 18 (2020) 117-126