Improving Bounds on the Additive Choice Number for Sparse Graphs

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An *additive coloring* of a graph G is a labeling of the vertices of G with integers such that no two adjacent vertices have the same sum of labels of their neighbors. The *additive choice number* of a graph G is then the minimum positive integer k such that whenever we give each vertex a list of at least k integers, there exists an additive coloring of G where the label of each vertex is chosen from its corresponding list. In 2017, Brandt, Diemunsch, and Jahanbekam proved that simple, planar graphs of girth at least 26 have additive choice number at most 3. In this talk, we present an alternate proof which avoids a lengthy discharging argument, instead utilizing a series of edge contractions and a maximum average degree argument. In addition, we will discuss ongoing efforts to extend the result through use of the Combinatorial Nullstellensatz and discharging.

Keywords: lucky labeling, additive coloring, additive choice number, Combinatorial Nullstellensatz, discharging