

ON CHERRY COLORING OF GRAPHS

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Within the framework of acyclic graph coloring, where every bichromatic component is required to be acyclic, two well-known coloring types impose additional structural restrictions on bichromatic components. A *star coloring* is an acyclic coloring in which every bichromatic component is a star or, equivalently, every bichromatic path has at most three vertices. On the other hand, a *linear coloring* is an acyclic coloring in which all bichromatic components are paths of arbitrary length. In this sense, these two notions may be viewed as nearly opposite extremal restrictions on bichromatic structures.

We investigate a coloring notion lying at the intersection of these two concepts. More precisely, we consider acyclic colorings in which every bichromatic component is a path on at most three vertices. The maximal bichromatic components then resemble a pair of cherries sharing a stem, which motivates the term *cherry coloring* for the coloring notion considered in this work. The minimum number of colors needed for a cherry coloring of a graph G is called the *cherry chromatic number* of G , denoted by $\chi_v(G)$.

We derive general lower and upper bounds on the cherry chromatic number and refine these bounds for three graph classes: planar, outerplanar, and regular graphs. Furthermore, we determine the exact value of this chromatic parameter for complete multipartite graphs and establish that, for trees, only two possible values may occur, together with a complete characterization of the cases in which each value appears.

Special attention is devoted to graphs of even maximum degree, where we identify substructures implying stronger lower bounds on the cherry chromatic number.