Neighborhood Balanced Colorings of Regular Graphs

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A neighborhood balanced coloring of a simple graph G is a partition of V(G) into two sets (say by coloring some vertices red and the rest blue) such that every vertex has an equal number of neighbors from each set. Freyberg and Marr introduced these colorings and established a number of results including a complete classification of the 4-regular circulants which admit such a coloring. We use eigenvalue techniques to extend this work to circulants and other regular graphs of higher degree. We also consider the question of finding all the neighborhood balanced colorings of a particular graph.

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