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An Algorithm for an Equitable Edge-coloring of a δ-peelable Graph

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Abstract: An edge-coloring of a graph G is equitable if, for each vertex v in G, the number of edges colored with any one color incident with v differs from the number of edges colored with any other color incident with v by at most one. This paper will focus on the equitable edge-coloring of the δ-peelable graphs where δ is the minimum of all the degrees of the vertices of G. A graph is said to be peelable if all the vertices can be iteratively peeled off. Given δ, the subgraph of G induced by all the vertices of G with degree divisible by δ is called the core of G. For purpose of simplicity, we will denote this subgraph by H_δ. If $d_{G(v)}$ represents the degree of vertex v in graph G, the vertices v_i; i = 1, . . . n, of a δ–peelable graph can be iteratively peeled off in an order $v_1, v_2, \ldots v_n$ using the following peeling operation: For each $1 \leq i \leq n$, peel off vertex v_i such that v_i has at most one neighbor v' in H_δ satisfying $d_{Gi-1}(v') = d_G(v')$ in G_{i-1}, where $G_{i-1} = G - \{v_1, v_2, \ldots v_{i-1}\}$ $(2 \leq i \leq n)$ and $G_0 = G$.

Xia Zhang and Guizhen Liu showed that if a graph G is k-peelable, then G has an equitable edge-coloring with k colors, $k \geq 2$. This result is from their paper entitled "Equitable Edge-colorings of Simple Graphs" which appeared in the Journal of Graph Theory in March 2011. The objective of this paper is to provide the necessary algorithm to obtain an equitable edge-coloring for the given result if $k = \delta$.

Key Words: edge-coloring; equitable edge-coloring; peelable graphs; core of a graph