On incidence adjacent vertex-distinguishing total coloring of graphs

Fatemeh Sadat Mousavi
University of Zanjan

Masoumeh Nouri *
University of Zanjan

Abstract

In this talk, we study total coloring (not necessarily proper) of graphs in which adjacent vertices are distinguished by their sets of colors. Zhang et al. in 2009 posed a conjecture regarding the upper bound for the minimum number of colors needed for such coloring of a graph in terms of maximum degree. We prove among some results that this conjecture is true for graphs with maximum degree 3.

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1 Introduction

All of the graphs considered in this paper are simple, finite and undirected graphs. We denote by $V(G)$ and $E(G)$ the set of vertices and edges of a graph G, respectively.

Definition 1.1. A semi total coloring c is a mapping from $V(G) \cup E(G)$ to $\mathbb{N}$ such that any two adjacent vertices and two adjacent edges receive distinct colors.

For any vertex x of G, let $S(x)$ denote the set of the colors of all edges incident to x together with the color assigend to x.

Definition 1.2. A semi total coloring is said to be an incidence adjacent vertex distinguishing total coloring if for every adjacent vertices x and y, $S(x) \neq S(y)$. The minimum number of colors required for an incidence adjacent vertex-distinguishing total coloring of G denote by $\chi^i_{at}(G)$ and is called the incidence adjacent vertex-distinguishing chromatic number of G.

Since an incidence adjacent vertex-distinguishing total coloring is a proper edge coloring, every graph satisfies $\chi^i_{at}(G) \geq \Delta(G)$. Moreover every graph G with two adjacent vertices of degree $\Delta(G)$ satisfies $\chi^i_{at}(G) \geq \Delta(G) + 1$.
After Burris and Schelp [3], Bazgan [2] and Balister et al. [1] discussed vertex-distinguishing proper edge coloring, Zhang et al. [5] presented the concept of adjacent vertex-distinguishing proper edge coloring of graphs.

*Speaker