

Magic type labelings of cycle products

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Abstract

A Cartesian product $C_m \square C_n$ of two cycles C_m and C_n can be seen as a toroidal $m \times n$ grid with mn vertices of degree four and $2mn$ edges.

We can bijectively label edges, vertices, or both by consecutive positive integers $1, 2, \dots, s$ or by elements of an Abelian group Γ of order s (where s is the number of labeled elements) and define the *weight* of an element (that is, an edge or a vertex) as the sum of labels of the adjacent and/or incident elements.

When the weights of all elements in question are equal, we call the labeling *magic* (of some kind). When the weights are all different, the labeling is called *antimagic*.

I will present some old and new results on various kinds of magic labelings of cycle products and pose several open questions.

The results are based on collaboration with several co-authors, including Tereza Kovářová, Petr Kovář, Jack McKeown, James McKeown, Michael McKeown, and Jiangyi Qiu.

Keywords: Graph labeling, magic type labeling, magic graphs, supermagic graphs.