Magic type labelings of cycle products

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Abstract

A Cartesian product $C_m \Box C_n$ 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 $1, 2, \ldots, s$ or by elements of an Abelian group $\Gamma$ 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 Kovárová, Petr Kovář, Jack McKeown, James McKeown, Michael McKeown, and Jiangyi Qiu.

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