Abstract

The thesis deals with the problem of labeling the vertices, edges and faces of a plane graphs by the consecutive integers in such a way that the label of a face and the labels of the vertices and edges surrounding that face all together add up to a weight of that face. If these face weights form an arithmetic progression with common difference d then the labeling is called d-antimagic. Such a labeling is called *super* if the smallest possible labels appear on the vertices.

The thesis examines the existence of such labelings for toroidal fullerenes, generalized prism and disjoint union of generalized prisms.

The toroidal fullerene is a 2-colorable cubic graph, there exist a 1-factor (perfect matching) and a 2-factor (a collection of n cycles on $2m$ vertices each). First we label the vertices of toroidal fullerene and then we label the edges of a 1-factor by consecutive integers and then in successive steps we label the edges of $2m$-cycles (respectively $2n$-cycles) in a 2-factor by consecutive integers. This technique allows us to construct super d-antimagic labelings of type $(1, 1, 1)$ of toroidal fullerenes for several values of d.

We consider the generalized prism as a collection of two classes of cycles: the main cycles and the middle cycles. To label the main cycles and the middle cycles we use the super (a, d)-edge-antimagic total and (a, d)-edge-antimagic total labelings and combine these labelings to a resulting super d-antimagic labeling of type $(1, 1, 1)$.

The disjoint union of generalized prism can be considered as a collection of disjoint union of *main* cycles and disjoint union of *middle* cycles. To label the disjoint union of main and middle cycles we again use edge-antimagic total labelings and super edge-antimagic total labelings. Combining these labelings we obtain a resulting super d-antimagic labeling of type $(1, 1, 1)$ for a given diference d.