International Journal of Chemoinformatics and Chemical Engineering
Volume 8 • Issue 1 • January-June 2019

The Law of Conservation of Incidents in the Space of Nanoworld

Gennadiy Vladimirovich Zhizhin, Skolkovo, Moscow, Russian Federation

ABSTRACT

This article first establishes the existence of integral equality relatively to the issue of the transmission of information by elements of lower and higher dimensions in the polytopes of the higher dimension that describe natural objects in the nanoworld. This integral equality is called the law of conservation of incidents. There is the incidence interpreted as the transfer of information from one material body to another. The fulfillment of the law of conservation of incidents for the n - simplex of the n - golden - hyper - rhombohedron and the n - cross - polytope is proved in general terms. It is shown that the law of conservation of incidents is valid for both regular bodies and irregular bodies, which can be clusters of chemical compounds. The incident conservation law can serve as a mathematical basis for the recently discovered epigenetic principle of the transmission of hereditary information without changing the sequence of genes in DNA and RNA molecules.

KEYWORDS

Atom, Cross-Polytope, Edge, Face, Hyper-Rhombohedron, Information, Molecule, Natural Object, Simplex

INTRODUCTION

In previous works of the author (Zhizhin, 2012; 2013; 2014a, 2014b, 2014c; 2015; 2016; 2018; 2019a, 2019b, 2019c, 2019d, 2019e; Zhizhin, & Diudea, 2016; Zhizhin, Khalaj, & Diudea, 2016), it was convincingly shown that various objects of the nanoworld have a higher dimension. In particular, many molecules of chemical compounds geometrically have the form of the polytopes of the higher dimension. Moreover, many of them are constructions with the main part in the form of an n - simplex or n - cross - polytope. Strictly speaking, any polytope can be reduced to an n - simplex by adding a sufficient number of edges to it without changing the number of vertices. As it turned out, an important place among polytopes describing chemical compounds are occupied by the cross - polytopes of higher dimension. It is enough to say that the connection of helices in DNA molecules with nitrogenous bases is carried out by the cross - polytope of dimension 13 (Zhizhin, 2019d, 2019e). In nanoclusters of chemical compounds, multi - shell structures of the highest dimension are widespread (Zhizhin, 2019c). In the analysis of the continuously distributed nanoworld, it was found (Zhizhin, 2015, 2019a) that the fundamental areas of their structures are the polytopic prismahedrons of the higher dimension, and not the stereohedrons that dreamed Delone B.N. (Delone, 1961; Delone, & Sandakova, 1961). A polytopic prismahedron is a multidimensional prism with bases in the form of

DOI: 10.4018/IJCCE.2019010103

polytopes of higher dimension (Zhizhin, 2019a). The simplest polytopic prismahedron is the golden hyper - rhombohedron of dimension 4, which was found in the analysis of intermetallic diffraction patterns (Zhizhin, 2013; Shevchenko, Zhizhin, Mackay, 2013; Zhizhin, 2014c). It is interesting to note that our children's ideas about elementary bricks (cubes and parallelepipeds) filling the space, based on the assumption of the three - dimensionality space, have no continuation in the space of the nanoworld. A logical continuation of our children`s ideas in the space of higher dimension could be a cube of the higher dimension, but the *n* - cube is not a fundamental area in the space of the nanoworld, since the study of numerous chemical compounds did not reveal elementary cells in the form of an *n* – cube (Zhizhin, 2018).

This work is devoted to the presentation and proof of the law found in the space of the nanoworld, characterized by the higher dimension of the components. It is connected with the concept of incidence in polytopes of the higher dimension.

In the monograph (Zhizhin, 2019a) has studied in detail the geometry of higher - dimensional polytopes, based on an analysis of the structures of chemical compounds (Zhizhin, 2018). The monograph (Zhizhin, 2019a) introduced the concept of the incidence coefficients of elements of lower dimension with respect to elements of the higher dimension and elements of higher dimension with respect to elements of the lower dimension. The first characterizes the number of elements of a certain higher dimension to which the given element of a lower dimension belongs. The second characterizes the number of elements of a given lower dimension that are included in a particular element of a higher dimension. Here we must remember that the vertices of geometric elements of various dimensions are atoms, molecules or functional groups. Therefore, the incidence of geometric elements to a friend means contact between particles of the matter, including living matter. The contact between particles of matter can be interpreted as the transfer of information on material structures, including biological structures. The monograph (Zhizhin, 2019 e) showed that the elements of nanostructures of living matter are objects of higher dimension. Information sharing is an inherent property of living beings, without which even primitive organisms would not be able to maintain an extremely delicate balance, which depends on their survival (Mancuso, &Viola, 2013; Mancuso, 2017). The monograph (Zhizhin, 2019 e) found that DNA, RNA molecules are polytopes of higher dimension, and nitrogenous bases connecting the double helix in the DNA molecule form a cross - polytopes of dimension 13. In this connection, the phenomenon of living organisms associated with DNA modification due to the binding of the methyl group CH_3 to the nitrogenous bases of DNA (methylation). This provides the memory of living organisms, i.e. transfer of inherited traits without changing the sequence of genes in DNA (Mancuso, 2017; Lindquist et al., 2016; Hawkes, Hennelly, Novikova et al., 2016). Therefore, it is of interest to study in detail the incidence of the entire polygamy of elements of different dimensions in higher dimension polytopes, considering it as a study of the possibility of transmitting information in biological molecules. This study is devoted to the article. It considers all possible incidents in convex bodies, starting with the simplest bodies and gradually complicating them.

Thus, the article for the first time posed the question of the possibility of transmitting information as a result of the contact of material objects having different dimensions in the space of the nanoworld. It is in this world that molecular formations have geometric shapes of higher dimensionality. This issue is of fundamental importance in the transmission of hereditary information.

INCIDENT CONSERVATION LAW FOR N - SIMPLEX

In a *n* - simplex (Zhizhin, 2014 c, 2019 a) the number of elements with dimension *d* is:

$$f_d(n) = C_{n+1}^{d+1} \tag{1}$$

The Metric Structure of Nucleic Acids and the Higher Dimension of Their Constituents

Gennadiy Vladimirovich Zhizhin (2018). *International Journal of Chemoinformatics and Chemical Engineering (pp. 1-15).*
www.irma-international.org/article/the-metric-structure-of-nucleic-acids-and-the-higher-dimension-of-their-constituents/232244