MULTIDIMENSIONAL MODELS OF CODING SYSTEMS BASED ON SYMMETRIC AND NON-SYMMETRIC GROUPS

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The objective of the paper is improving the qualitative indices of vector data coding systems with respect to reliability, and other significant operating characteristics of the systems based on the combinatorial configurations theory, namely the principle of optimal cyclic proportions (OCP). Research into the underlying mathematical models relates to the optimal placement of multidimensional digit weights in vector code combinations. Some problems of computer engineering and information technologies which deal with profitable use of mathematical models and methods for optimization of systems based on the multidimensional combinatorial configurations such as multidimensional Ideal Ring Bundles (IRB)s are discussed. Properties of underlying models function favorably with fundamental laws of symmetry and asymmetry interrelation taken into account. Special attention is paid to geometric interpretation of symmetric groups and its asymmetric subgroups interrelations. The combinatorial model of the complementary relations of 2D uniform fields and its multidimensional transformations with an ability to reproduce the maximum number of combinatorial varieties of complementary non-uniform subfields of the fields as the hypothetically informative field of harmony is discussed. In this reasoning the model is preceded from the remarkable properties of circular symmetry as the complementary combinatorial asymmetrical structures and multivariable of its ensembles. The possibility of application of a new class of spatial groups using multidimensional symmetrical and non-symmetrical combinatorial configurations for vector data coding design with minimal number of the digit weights is shown. Mutual connection of the symmetrical and asymmetrical groups with algebraic structures in Galois fields is discussed. A new multidimensional conceptual model of profitable vector data coding systems based on application of symmetry and non-symmetry relationship combinatorial properties was proposed.

The optimal cyclic proportions (OCP)s and multidimensional Ideal Ring Bundles (IRB)s provide new conceptual models of the optimum coding systems. The optimization has been embedded in the underlying combinatorial models, which provide an ability to reproduce the maximum number of vector code combinations in the coding systems with a limited number of vector data digits, while all consecutive symbols “1” as well as “0” in the cyclic combinations are arranged together as so-called “IRB-monolithic code”. This property allows improving reliability of code because all combinations as being non identical in consecutive symbols are forbidden combinations. The favorable qualities of the multidimensional Ideal Ring Bundles (IRB)s are based on the underlying symmetrical and non-symmetrical combinatorial relationships provide opportunities to apply them to advanced vector data information technology, including applications to coded design of 3D signals for communications and multidimensional vector processors.

Keywords – information technology, mathematical model, system, combinatorial configuration, optimization, structure, symmetry and asymmetry interrelation, group, Galois field, vector data coding,.