

Abstract

## Heterogeneous Relational Association Schemes

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We deal with study of finite-dimensional subalgebras of partial algebra  $M_{n_1, \dots, n_l}^G(K)$  of  $G$ -symmetric matrices. Particular cases of such subalgebras, deep consisting of usual two-dimensional matrices, are known under a range of titles such as the Mesner algebras, Bose-Choudhori algebras, cellular rings, coherent configurations, association schemes and so. Well known are also their applications in discrete mathematics: to the graph theory, coding theory and block designs. Purpose of our research is to generalize abovenamed structures to the level of multidimensional polycubic matrices, polyary relations and polystructures. As key source of such generalizations we consider finite-dimensional heterogeneous algebras of  $G$ -symmetric polycubic matrices. They are subalgebras of partial algebra  $M_{n_1, \dots, n_l}^G(K)$ , and their bases consists of  $(0, 1)$ -matrices of polyary relations and regular polygraphs. Structural constants of this algebras adopt combinatorial interpretation in analogy with usual relational association schemes.