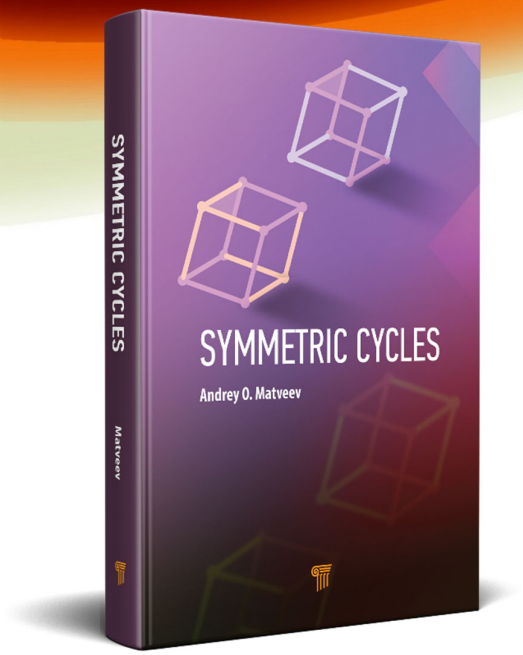
Symmetric Cycles



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Description

This original research monograph concerns various aspects of how (based on the decompositions of vertices of hypercube graphs with respect to their symmetric cycles) the vertex sets of related discrete hypercubes, as well as the power sets of the corresponding ground sets, emerge from rank 2 oriented matroids, from underlying rank 2 systems of linear inequalities, and thus literally from arrangements of straight lines crossing a common point on a piece of paper. It reveals some beautiful and earlier-hidden fragments in the true foundations of discrete mathematics. The central observation made and discussed in the book from various viewpoints consists in that $2t$ subsets of a finite t-element set E_t, which form in a natural way a cyclic structure (well, just t subsets that are the vertices of a path in the cycle suffice), allow us to construct any of 2^t subsets of the set E_t by means of a more than elementary voting procedure expressed in basic linear algebraic terms. The monograph will be of interest to researchers, students, and readers in the fields of discrete mathematics, theoretical computer science, Boolean function theory, enumerative combinatorics and combinatorics on words, combinatorial optimization, coding theory, and discrete and computational geometry.

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