Combinatorial Aspects of the Alternating Sign Matrix

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Abstract

The *Alternating Sign Matrix Polytope*, ASM_n is the convex hull of $n \times n$ matrices whose entries are 0, 1, and -1, whose non-zero entries alternate in sign, and whose row and column sums are 1. These polytopes were initially defined by Striker, and by Behrend and Knight. Brualdi and Dahl, as well as Lascoux, initiated the study of paths in the graph of the ASM_n polytope. As with the earlier authors, we are looking for an upper bound on the distance in the graph from an ASM to the nearest permutation matrix. We will also investigate the combinatorial properties of faces of the ASM polytope.

Keywords: convex hull, matrix, polytope.