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A Conjecture on the Hilbert Series of Binomial Ideals Associated with Simple Polyominoes

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Abstract

We will discuss certain types of binomial ideals arising from combinatorial structures. In particular, focus will be on the binomial ideals arising from

1. certain sets of 2-minors of a matrix of indeterminates (also known as polyomino ideals);

2. incomparable elements in finite distributive lattices (also known as join-meet ideals).

We will present a conjecture on the reduced Hilbert series of the coordinate ring of a simple polyomino ideal in terms of particular arrangements of non-attacking rooks that can be placed on the polyomino. By using a computational approach, the conjecture holds for all simple polyominoes up to rank 11. By using an algebraic approach, the conjecture holds true for the class of parallelogram polyomino ideals, by looking at those as join-meet ideals of simple planar distributive lattices. We will also give a combinatorial interpretation(in terms of Motzkin paths) of the Gorensteinnes of parallelogram polyomino ideals.

This talk is based on a recent joint work with Francesco Romeo and Giancarlo Rinaldo.

Date : Friday, May 13, 2022
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