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Surprising Relations Among Catalan Polynomials and Hikita Polynomials

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In 2012 Hikita showed that the Borel–Moore homology of certain affine Springer fibers of type A produced bigraded S_n modules whose bigraded Frobenius series is a generalization of polynomials introduced by Haglund, Haiman, Loehr, Remmel, and Ulyanov to describe characters of diagonal coinvariants. Since then, great effort has gone into understanding basic phenomena about Hikita's polynomials, with a complete description only given in the most basic cases.

Recently, a complete formula for the 3-column bigraded rational Catalan polynomial was found. While it is known that the lowest order term of Hikita's polynomials is equal to the rational Catalan polynomial, other Catalan-like expressions arise in the description of the 3-row Hikita polynomial.

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