Combinatorial description of the cohomology of the affine flag variety

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Abstract

We construct the affine version of the Fomin-Kirillov algebra, called the affine FK algebra, to investigate the combinatorics of affine Schubert calculus for type A. We introduce Murnaghan-Nakayama elements and Dunkl elements in the affine FK algebra. We show that they are commutative as Bruhat operators, and the commutative algebra generated by these operators is isomorphic to the cohomology of the affine flag variety. As a byproduct, we obtain Murnaghan-Nakayama rules both for the affine Schubert polynomials and affine Stanley symmetric functions. This enable us to express k-Schur functions in terms of power sum symmetric functions. We also provide the defi- nition of the affine Schubert polynomials, polynomial representatives of the Schubert basis in the cohomology of the affine flag variety.

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