

Research Plan

(1) A geometric meaning of an additive basis for the cohomology rings of regular nilpotent Hessenberg varieties

We constructed an additive basis for the cohomology rings of regular nilpotent Hessenberg varieties by a joint work with Makoto Enokizono, Takahiro Nagaoka, and Akiyoshi Tsuchiya. This basis is obtained by extending the Poincaré duals of smaller regular nilpotent Hessenberg varieties in the given regular nilpotent Hessenberg variety. I want to study a geometric meaning of the basis.

(2) A filtration on the cohomology rings of regular nilpotent Hessenberg varieties

We derived a filtration on the cohomology ring of regular nilpotent Hessenberg varieties by a joint work with Megumi Harada, Satoshi Murai, Martha Precup, and Julianna Tymoczko. I would like to study a geometric meaning of the filtration.

(3) Harada-Tymoczko conjecture

By a joint work with Megumi Harada, Satoshi Murai, Martha Precup, and Julianna Tymoczko, we gave an algorithm for all linear relations among the images of the Schubert classes under the restriction map from the cohomology ring of the flag variety to the cohomology ring of a regular nilpotent Hessenberg variety. Our goal is to solve Harada-Tymoczko conjecture which states that a certain subset of the images of Schubert classes forms a basis for the cohomology rings of the regular nilpotent Hessenberg variety.

(4) Hessenberg Schubert polynomials

We introduced Hessenberg Schubert polynomials by a joint work with Megumi Harada, Satoshi Murai, Martha Precup, and Julianna Tymoczko. It is difficult to calculate Hessenberg Schubert polynomials in general, so first I would like to study properties of them.