

SCHUBERT CALCULUS, SEEN FROM TORUS EQUIVARIANT TOPOLOGY

SHIZUO KAJI (HUKUOKA UNIVERSITY)

Abstract: I will give two talks on Schubert calculus, with emphasis on the torus action. Schubert calculus is a study of the geometry of a flag variety, which is defined as the homogeneous space of a compact Lie group G divided by its subgroup P containing a maximal torus T . Since flag varieties are so basic objects in various areas of mathematics, there are a lot of ways to explore this fertile land. Here we'll take an inclination for a view from torus equivariant topology. A flag variety has an ideal action of the maximal torus T , which is hamiltonian with isolated fixed points corresponding to the elements of the Weyl group. Hence, the localization technique, widely known as "GKM theory," offers a powerful machinery to deal with topological invariants such as the equivariant cohomology of flag varieties combinatorially. Fortunately enough for those who have a liking for computation, this is actually applicable to calculations, through which we can see a concrete aspect of the subject.

I will start with brief history of the subject and then review basic notions, playing with the most fundamental example of Grassmannian manifolds. Then I will introduce two descriptions of the torus-equivariant cohomology of flag varieties, one by the GKM graph, the other by the polynomial ring with two series of indeterminant, and discuss the interaction between them. With these preparations, we'll set out for a somewhat outskirts region of the study, namely a concrete calculation of the torus equivariant cohomology of the flag varieties associated to exceptional Lie groups.