TORIC RICHARDSON VARIETIES

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Abstract

The flag variety $\mathcal{F}\ell_n$ is a homogeneous space having the action of algebraic torus $\mathbb{T} = (\mathbb{C}^*)^n$. For two permutations $v, w \in \mathfrak{S}_n$ with $v \leq w$ in the Bruhat order, the Richardson variety X_w^v is defined to be the intersection of the Schubert variety X_w and the opposite Schubert variety X^v. It is known that X_w^v is a $\mathbb{T}$-invariant irreducible subvariety of $\mathcal{F}\ell_n$. We say that X_w^v is toric if there is a point $x \in X_w^v$ such that $X_w^v = \overline{\mathbb{T} \cdot x}$. In this talk, we first introduce that every smooth toric Richardson variety is a Bott manifold, and then give a sufficient condition on v and w for X_w^v to be a smooth toric Richardson variety. Interestingly, we can count the number of smooth toric Richardson varieties given by the sufficient condition, using the number of unordered rooted binary trees. This talk is based on joint work with Eunjeong Lee and Mikiya Masuda.

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