Spherical Subgroups and Double Coset Varieties

Let $G$ be a connected reductive algebraic group, $H \subset G$ a reductive subgroup and $T \subset G$ a maximal torus. It is well known that if characteristic of the ground field is zero, then the homogeneous space $G/H$ is a smooth affine variety, but never an affine space. The situation changes when one passes to double coset varieties $F \backslash G//H$. In this paper we consider the case of $G$ classical and $H$ connected spherical and prove that either the double coset variety $T \backslash G//H$ is singular, or it is an affine space. We also list all pairs $H \subset G$ such that $T \backslash G//H$ is an affine space.

Keywords: Double coset varieties.

MSC: 14L30,14M17