The complex flag manifold $Fl_n(\mathbb{C})$ is the space of all nested sequences $V_1 \subset V_2 \subset \ldots \subset V_n$ where each V_k is a k-dimensional vector subspace of $\mathbb{C}^n$. It has a natural action of the group (torus) T of all diagonal unitary $n \times n$ matrices. The equivariant cohomology ring of $Fl_n(\mathbb{C})$ with respect to this action is known: there exist a presentation in terms of generators and relations and another one, which uses the fixed points of the action. In my talk I will discuss similar presentations of the equivariant cohomology rings with respect to certain natural Lie group actions for the (real) flag manifolds $Fl_n(\mathbb{H})$ and $Fl(\mathbb{O})$, where $\mathbb{H}$ and $\mathbb{O}$ are the algebras of quaternions, respectively octonions.