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The First and Second Homotopy Groups of a Homogeneous Space of a Complex Linear Algebraic Group

Let X be a homogeneous space of a connected linear algebraic group G defined over the field of complex numbers \mathbb{C} . Let $x \in X(\mathbb{C})$ be a point. We denote by H the stabilizer of x in G . When H is connected, we compute the topological fundamental group $\pi_1^{\text{top}}(X(\mathbb{C}), x)$. Moreover, we compute the second homotopy group $\pi_2^{\text{top}}(X(\mathbb{C}), x)$.

Keywords: Fundamental group, second homotopy group, homogeneous space, linear algebraic group.

MSC: 14F35, 14M17, 20G20.