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Linear Maps Preserving Fibers

Let $G \subset \mathrm{GL}(V)$ be a complex reductive group where $\dim V < \infty$, and let $\pi\colon V \to V/G$ be the categorical quotient. Let $\mathcal{N} := \pi^{-1}\pi(0)$ be the null cone of V, let H_0 be the subgroup of $\mathrm{GL}(V)$ which preserves the ideal $\mathcal{I}$ of $\mathcal{N}$ and let H be a Levi subgroup of H_0 containing G. We determine the identity component of H. In many cases we show that $H = H_0$. For adjoint representations we have $H = H_0$ and we determine H completely. We also investigate the subgroup G_F of $\mathrm{GL}(V)$ preserving a fiber F of π when V is an irreducible cofree G-module.

Keywords: Invariants, null cone, cofree representations.

MSC: 20G20, 22E46, 22E60