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Invariant Subrings of Regular Algebras under Hopf Algebra Actions

The Shephard–Todd–Chevalley Theorem states that if a finite group G acts on a commutative polynomial ring $A = k[V]$ as elements of $GL_n(V)$, then the ring of invariants A^G is a polynomial ring if and only if G is generated by reflections. In the same context Watanabe’s Theorem states that if G acts on A as elements of $SL_n(V)$, then the ring of invariants A^G is a Gorenstein ring. We consider generalizations of these theorems to the noncommutative setting where A is a noetherian Artin–Schelter regular algebra with a finite group G acting linearly on A . More generally we consider actions on A by a finite dimensional semi-simple Hopf algebra H , where each homogeneous component A_j is an H -module and A is an H -module algebra.

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