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Invariant Theory and Lie Groups

The $\mathrm{mod}\, p$ cohomology of a Lie group is a Hopf algebra, *i.e.*, both an algebra and a coalgebra. It is well known, going back to the work of Borel and Chevaley in the 1950's, that the rational cohomology of a connected Lie group G and of its classifying space BG can be determined from a knowledge of the invariant theory of the Weyl group of G. This same result holds in $\mathrm{mod}\, p$ cohomology provided p is not a torsion prime for G (p is a torsion prime if p torsion appears in the integral cohomology of G). Kac and Peterson introduced the concept of generalized invariants of a Weyl group and demonstrated that generalized invariants determine the $\mathrm{mod}\, p$ cohomology of G when p is a torsion prime. We will consider the relation between the generalized invariants of G and the coalgebra structure of the $\mathrm{mod}\, p$ cohomology of G.