Invariants and semi-invariants in the cohomology of the complement of a reflection arrangement

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Suppose V is a finite dimensional, complex vector space, A is a finite set of codimension one subspaces of V, and G is a finite subgroup of the general linear group GL(V) that permutes the hyperplanes in A. In this paper we study invariants and semi-invariants in the graded QG-module H*(M(A)), where M(A) denotes the complement in V of the hyperplanes in A and H* denotes rational singular cohomology, in the case when G is generated by reflections in V and A is the set of reflecting hyperplanes determined by G, or a closely related arrangement.

Our main result is the construction of an explicit, natural (from the point of view of Coxeter groups) basis of the space of invariants, H*(M(A))^G. In addition to leading to proof of the description of the space of invariants conjectured by Felder and Veselov for Coxeter groups that does not rely on computer calculations, this construction provides an extension of the description of the space of invariants proposed by Felder and Veselov to arbitrary finite unitary reflection groups.

This is a report on join work with Matt Douglass and Götz Pfeiffer.