1060-05-81   **Thomas Bliem*** (`bliem@math.sfsu.edu`), Department of Mathematics, San Francisco State University, 1600 Holloway Ave, San Francisco, CA 94132. *Determining multivariate quasi-polynomials for weight multiplicities and Clebsch–Gordan coefficients.*

For a symmetrizable Kac–Moody algebra, we study the weight multiplicity of a weight μ in a Demazure module of highest weight λ as a function of λ and μ, i.e., as a function of $2r$ variables if r is the rank of the Kac–Moody algebra. Similarly, for a semisimple Lie algebra, we study Clebsch–Gordan coefficients $c_{\mu,\nu}^{\lambda}$ as a function of λ, μ, ν, i.e., as a function of $3r$ variables. We show that each of these functions is piecewise quasi-polynomial and we give an algorithm to determine the quasi-polynomials. We use this algorithm to explicitly determine the regions of quasi-polynomiality and all quasi-polynomials for some examples.

The crucial ingredients are the following: We use polyhedral models of representations to reduce both problems to counting integral points in multi-parametric families of polytopes. This allows for an expression of the functions with vector partition functions. We then use an algorithm based on a residue formula by Szenes/Vergne to compute quasi-polynomials for these vector partition functions. (Received March 21, 2010)