ON HILBERT SERIES OF RELATIVELY FREE G-GRADED ALGEBRAS

Abstract: Let $G = \{g_1, g_2, \ldots, g_s\}$ be a finite group (order s) and let $F\langle x_{g_1}, \ldots, x_{g_s}\rangle$ be the free algebra (over F) generated by variables indexed by elements of G. Here F is any field of characteristic zero. We consider a certain type of equivalence relations among monomials (which we call informally "rules") and let I be the ideal in $F\langle x_{g_1}, \ldots, x_{g_s}\rangle$ generated by a set of "rules". We show that the Hilbert series of $F\langle x_{g_1}, \ldots, x_{g_s}\rangle/I$ is a rational function. (Recall that the Hilbert series of $F\langle x_{g_1}, \ldots, x_{g_s}\rangle/I$ is given by $\sum d_n x^n$ where d_n is the dimension of the space spanned by monomials of degree $\leq n$ in $F\langle x_{g_1}, \ldots, x_{g_s}\rangle/I$). (Joint work with A. Kanel-Belov).