

Central simple modules of an Artinian Gorenstein algebra
Tony Iarrobino - Tapas talk 5/2009
– Work joint with M. Boij

Let R be the polynomial ring in r variables over a field k . Let $A = R/I$ be a standard Artinian algebra quotient of R , not necessarily graded. For A graded and a given linear form z in A_1 , T Harima and J. Watanabe in a series of papers studied the “central simple modules” (CSM) of the pair (A, z) : these are the nonzero factor modules (here c is the socle degree of A) of the sequence

$$(0 : z^c) + (z) \supset (0 : z^{c-1}) + (z) \supset \cdots \supset (0 : z) + (z)$$

and used it to study the Lefschetz properties of (A, z) . The latter have to do with the Jordan block decomposition of the multiplication map m_z “multiply by z ” on A . In particular Harima and Watanabe showed that the CSM’s were “self-dual” when A is Gorenstein graded. We will describe these concepts, give examples, and suggest how they might generalize to non-graded A that are Gorenstein, as well as open questions.

If there is time we will discuss how these concepts may be relevant to the study of pairs of commuting nilpotent matrices.