Wolmer Vasconcelos: The Homology of Parameter Ideals

Abstract: Parameter ideals can be used to study structural aspects of finitely generated modules over commutative Noetherian local rings: Cohen-Macaulayness, Buchsbaumness, and of having finitely generated local cohomology. For a module $M$ and parameter ideals $\mathbf{x}$, we look at two sets of numerical indicators: One set arises from the first Hilbert coefficients $e_1(\mathbf{x}; M)$, while another series of integers arises from partial Euler characteristics $\chi_1(\mathbf{x}; M)$. Viewing these values as functions of $\mathbf{x}$, joint work with L. Ghezzi, S. Goto, J. Hong, K. Ozeki and T. T. Phuong has shown these numbers carry similar properties of the module. Given these common roles as predictors of the Cohen-Macaulay property in particular, we consider several questions about the direct comparison of $e_1(\mathbf{x}, M)$ and $\chi_1(\mathbf{x}; M)$. For that we require an extension of the notion of partial Euler characteristic.