Mathematics, Statistics, and Computer Science **@ UIC**

Commutative Algebra Seminar

The local cohomology of a parameter ideal with respect to an arbitrary ideal

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Abstract: Let S be a complete intersection presented as R/J for R a regular ring and J a parameter ideal. Let I be an ideal containing J. It is well known that the set of associated primes of $H^i_I(S)$ can be infinite, but far less is known about the set of minimal primes. In 2017, Hochster and Núñez-Betancourt showed that if R has prime characteristic $p > 0$, then the finiteness of Ass $H^i_I(J)$ implies the finiteness of Min $H^{i-1}_I(S)$, raising the following question: is Ass $H^i_I(J)$ always finite? We give a positive answer when $i=2$ but provide a counterexample when $i=3$. The counterexample crucially requires Ass $H^2_I(S)$ to be infinite. The following question, to the best of our knowledge, is open: (under suitable hypotheses on R) does the finiteness of Ass $H^{i-1}_I(S)$ imply the finiteness of Ass $H^i_I(J)$? When S is a domain, we give a positive answer when $i=3$. When S is locally factorial, we extend this to $i=4$. Finally, if R has prime characteristic $p > 0$ and S is regular, we give a complete answer by showing that Ass $H^i_I(J)$ is finite for all values of i.

Wednesday, October 30 at 4:00 PM in 1227 SEO