Meeting: 999, Nashville, Tennessee, SS 6A, Special Session on Local and Homological Algebra

999-13-140 **Ian M Aberbach*** (aberbach@math.missouri.edu), Department of Mathematics, University of Missouri, Columbia, MO 65211. *The existence of the F-signature in certain cases.* Preliminary report.

Let (R, m, k) be an F-finite reduced ring of positive prime characteristic p and dimension d. Assume that k is perfect. For $q = p^e$ let $R^{1/q}$ be the ring of qth roots of elements of R. Since R is F-finite, $R^{1/q}$ is a finite R-module. Let a_q be the number of R-free summands of $R^{1/q}$.

R is strongly F-regular if and only if a_q grows proportionally to q^d. Huneke and Leuschke defined the F-signature of R to be $s(R) = \lim_{q\to\infty} a_q/q^d$, provided this limit exists. The limit is known to exist when R is Q-Gorenstein on the punctured spectrum. In essence the argument boils down to showing that the following condition holds: There exists a fixed irreducible m-primary ideal I with socle element u such that if $v \in E = E_R(k)$ is the socle element of the injective hull of the residue field and $cv^q = 0$ in $F^e(E)$ then, in fact, $cu^q \in I^{[q]}$.

We aim to show that if the defining ideal of the non-Q-Gorenstein locus of R has dimension at most 1 (in particular, this will be the case for 4-dimensional rings), then the limit exists. The condition listed in the paragraph above is *not* known to hold, but, curiously, we are able to work around it in many cases. (Received August 19, 2004)