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F-jumping numbers of test ideals

Alberto F. Boix,

Given a pair $(X, \mathfrak{a})$, where $X = \operatorname{Spec}(R)$ is an affine normal algebraic variety of characteristic zero and $\mathfrak{a} \subseteq R$ is an ideal, one can associate it a decreasing chain of multiplier ideals

$$\mathcal{J}(X; \mathfrak{a}^{n_1}) \supseteq \mathcal{J}(X; \mathfrak{a}^{n_2}) \supseteq \mathcal{J}(X; \mathfrak{a}^{n_3}) \supseteq \dots$$

indexed by real numbers n_i's (where $n_i \leq n_{i+1}$). The digits where the inclusion is strict are called *jumping numbers* of the pair $(X, \mathfrak{a})$. From the existence of resolution of singularities one deduces that these digits form a discrete subset of rational numbers.

In prime characteristic, the analog of the multiplier ideal is the so-called *test ideal*; actually, given a pair as before $(X, \mathfrak{a})$ (where now R is a ring of positive characteristic), one can attach it a decreasing chain of test ideals

$$\tau(X; \mathfrak{a}^{n_1}) \supseteq \tau(X; \mathfrak{a}^{n_2}) \supseteq \tau(X; \mathfrak{a}^{n_3}) \supseteq \dots$$

The real numbers where the inclusion is strict are the so-called *F-jumping numbers* of $(X, \mathfrak{a})$. If X is smooth, these digits are known to form a discrete subset of rational numbers; however, if X is singular, this problem is open in general.

The purpose of this talk is to show the discreteness of F-jumping numbers of the pair $(\operatorname{Spec}(R), \mathfrak{a})$, where $R := K[\![x_1, \dots, x_d]\!]/I$, I is a squarefree monomial ideal, $\mathfrak{a}$ is any ideal of R, and K is a perfect field of prime characteristic.

The content of this communication is based in a joint work with Josep Àlvarez Montaner and Santiago Zarzuela.

Department of Economics and BusinessUniversitat Pompeu FabraJaume I Building, Ramon Trias Fargas 25-27, 08005 Barcelona, Spain.alberto.fernandezb@upf.edu