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Geometric Auslander criterion for flatness

Flatness is a subtle algebraic notion that expresses continuity of the fibres of a mapping, but it has remained geometrically elusive. The aim of this talk is to understand the notion of flatness in explicit geometric terms. We show that non-flatness of a morphism of schemes of finite type with a regular target of dimension n manifests in the existence of the so-called vertical components in the n-fold fibred power of the morphism (i.e., components with a nowhere dense image). This leads to an effective algorithm for flatness over regular affine algebras, by means of Grobner bases.

This work was done with E. Bierstone and P. D. Milman.