Quantifying residual finiteness in groups and algebras
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For finitely generated residually finite groups, the growth of the residual girth (the size of finite quotients required to detect $n$-balls of the Cayley graph) is a useful invariant with geometric and computational applications.

We define and study a naturally analogous invariant for finitely generated residually finite dimensional algebras. We analyze several examples, showing that the residual girth growth of group algebras might significantly differ from their group counterparts, and are highly sensitive to the base field structure. We show that for various families of residually finite dimensional algebras the residual girth grows like the usual growth (in the sense of Gelfand-Kirillov). In particular, we prove this for finitely generated prime PI algebras (using a noncommutative Hironaka decomposition argument). This is far from being true in general: we construct finitely generated algebras with GK-dimension 2 having arbitrarily fast residual girth growth.

The talk is based on a work in progress, partially joint with Khalid Bou-Rabee.