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Equivalence between brick-finite and representation-finite property for skew-gentle algebras

Skew-gentle algebras, introduced by C. Geiss and J.A. de la Peña in 1999, generalize gentle algebras, extending some of their combinatorial and geometric properties. They admit geometric models in terms of marked surfaces with orbifold points, enabling the study of their algebraic properties via the combinatorics of the surface. This perspective connects skew-gentle algebras to tagged triangulations and cluster algebras, and provides an effective combinatorial framework for analyzing their derived categories. A notable feature of these algebras is that all indecomposable modules can be classified combinatorially.

Bricks are modules that have a local endormorphism ring, and thus are indecomposable. In 2017, L. Demonet, O. Iyama, and G. Jasso showed that the study of bricks is essential for τ-tilting theory. In this context, whether the number of bricks is finite or not is a crucial question. When the algebra is gentle, P. Plamondon showed that being representation-finite, that is, having finitely many indecomposable representations, is equivalent to having finitely many bricks.

In this poster, we study the generalization of this result to skew-gentle algebras. We show that any skew-gentle algebra of infinite representation type admits a minimal band of one of four types, that we explicitly describe. By analyzing the associated subalgebras, we construct an infinite family of brick modules, thus showing that, for a skew-gentle algebra, being representation-finite is equivalent to being brick-finite.