

Torsion and wide shadows of gentle algebras

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Abstract

A full additive subcategory \mathcal{B} of $\text{mod } A$ is weakly extension-closed if for each short exact sequence $0 \rightarrow X \rightarrow Y \rightarrow Z \rightarrow 0$ with X, Y and Z indecomposable A -modules, if X and Z in \mathcal{B} , then Y in \mathcal{B} . Moreover, \mathcal{B} is biclosed if \mathcal{B} and \mathcal{B}^c are both weakly extension-closed, where $\mathcal{B}^c := \{X \in \text{mod } A \mid \text{add}(X) \cap \mathcal{B} = 0\}$. For some families of finite dimensional algebras, the lattice of torsion classes of $\text{mod } A$ is obtained as a quotient lattice of the poset of biclosed subcategories. To every τ -tilting finite brick gentle algebra $A = kQ/I$, we associate an algebra $\Pi(A)$, such that every torsion class in $\text{mod } \Pi(A)$ induces a corresponding subcategory of $\text{mod } A$, which we call *torsion shadow*. We show that torsion shadows are exactly the biclosed subcategories of $\text{mod } A$. This gives a new and more concrete realization of the latter family. Analogously, we introduce *wide shadows* and show how the families of torsion shadow and wide shadow subcategories interact. This is joint work with A. Garver and T. McConville.