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On a homological problem for module categories with infinite radical cube zero

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Let A be an artin algebra over a commutative artin ring K. We denote by $\operatorname{mod} A$ the category of finitely generated right A-modules, by $\operatorname{ind} A$ the full subcategory of $\operatorname{mod} A$ consisting of indecomposable modules, and by $\operatorname{rad}_A^\infty$ the infinite Jacobson radical of $\operatorname{mod} A$ (being the intersection of all powers rad_A^i, $i \geqslant 1$, of the Jacobson radical rad_A of $\operatorname{mod} A$). It has been proved by M. Auslander that an artin algebra A is of finite representation type if and only if $\operatorname{rad}_A^\infty = 0$. In fact, by a result proved by F. U. Coelho, E. M. Marcos, H. A. Merklen and A. Skowroński, $(\operatorname{rad}_A^\infty)^2 = 0$ implies that A is of finite representation type. Moreover, they investigated also the structure of module categories $\operatorname{mod} A$ with $(\operatorname{rad}_A^\infty)^3 = 0$.

About 12 years ago A. Skowroński conjectured that the following two conditions for an artin algebra A are equivalent:

(1) For all but finitely many isomorphism classes of modules X in $\operatorname{ind} A$, we have $\operatorname{pd}_A X \leqslant 1$ or $\operatorname{id}_A X \leqslant 1$.

(2) A is a generalized double tilted algebra or a quasitilted algebra.

The aim of this talk is to confirm the above conjecture for module categories with infinite radical cube zero.

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