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Exterior powers and Tor-persistence. (English) [Zbl 07428836]

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Summary: A commutative Noetherian ring $R$ is said to be Tor-persistent if, for any finitely generated $R$-module $M$, the vanishing of $\text{Tor}_i^R(M, M)$ for $i \gg 0$ implies $M$ has finite projective dimension. An open question of Avramov, et al. asks whether any such $R$ is Tor-persistent. In this work, we exploit properties of exterior powers of modules and complexes to provide several partial answers to this question; in particular, we show that every local ring $(R, \mathfrak{m})$ with $\mathfrak{m}^3 = 0$ is Tor-persistent. As a consequence of our methods, we provide a new proof of the Tachikawa Conjecture for positively graded rings over a field of characteristic different from 2.

MSC:
13D07 Homological functors on modules of commutative rings (Tor, Ext, etc.)
13C10 Projective and free modules and ideals in commutative rings
13D02 Syzygies, resolutions, complexes and commutative rings

Keywords:
exterior squares; Tachikawa’s conjecture; Tor-persistence

Full Text: DOI

References:


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